

# TM 5-4120-268

DEPARTMENT OF THE ARMY TECHNICAL

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**OPERATOR, ORGANIZATIONAL, DS, GS, AND DEPOT  
MAINTENANCE MANUAL**

**AIR CONDITIONER: VERTICAL COMPACT,  
FLOOR MOUNTED**

**36,000 BTU/HR COOLING, 30,000 BTU/HR HEATING;  
208 VOLT, 3 PHASE, 50/60 CYCLE, (TRANE MODEL  
MAC6V40-340-2) FSN 4120-935-5421, 208 VOLT,  
3 PHASE, 400 CYCLE (TRANE MODEL MAC4V40-340-3)  
FSN 4120-935-5418**

## **SAFETY PRECAUTIONS**

### **BEFORE OPERATION**

Disconnect air conditioner from power source before performing maintenance on component unit.

Avoid bodily contact with liquid refrigerant and avoid inhaling refrigerant gas. Be careful. Refrigerant-22 does not contact eyes. In case of leaks, ventilate area immediately.

### **DURING OPERATION**

Avoid bodily contact with liquid refrigerant and avoid inhaling refrigerant gas. Be careful. Refrigerant-22 does not contact eyes. In case of leaks, ventilate area immediately.

Disconnect air conditioner from power source before performing maintenance on component unit.

Before restart, wait 5 minutes.

### **AFTER OPERATION**

Disconnect air conditioner from power source before performing maintenance on component unit.

Avoid bodily contact with liquid refrigerant and avoid inhaling refrigerant gas. Be careful. Refrigerant-22 does not contact eyes. In case of leaks, ventilate area immediately.

CHANGE }  
No. 1 }

HEADQUARTERS  
DEPARTMENT OF THE  
WASHINGTON, D.C., 18, Octo

**Operator, Organizational, DS, GS, and Depot  
Maintenance Manual**

**AIR CONDITIONER, VERTICAL, COMPACT; FLOOR MOUNTED;  
36,000 BTU/HR COOLING, 30,000 BTU/HR HEATING;  
208 VOLT, 3 PHASE, 50/60 CYCLE, (TRANE MODEL  
MAC 6V40-340-2) FSN 4120-935-5421; 208 VOLT, 3  
PHASE, 400 CYCLE (TRANE MODEL MAC 4V40-340-3)  
FSN 4120-935-5418**

TM 5-4120-268-15, 7 May 1969, is changed as follows:

*Page i.* Chapter 3, Section VIII. Change "drain piping" to read "drain tube".

*Page 1-1.* Paragraph b. Delete the third sentence and substitute the following:

"Organizational Maintenance Repair Parts special Tools are listed and illustrated in TM 268-20P. Direct and General Support and Maintenance Repair Parts and Special Tools are listed and illustrated in TM 5-4120-268-35E

STORED POSITION OF CANVAS COVER FOR  
OPERATION

TOP PANEL

TOP SUPPORT HOLES (9)

EVAPORATOR  
FAN MOTOR  
ACCESS COVER

LIFTING  
HANDLE (2)

CBR COVER

LIQUID SIGHT  
INDICATOR

FRESH AIR  
INLET

DAMPER DOOR  
CONTROL KNOB

CONDENSER FAN  
AIR INTAKE  
SCREEN

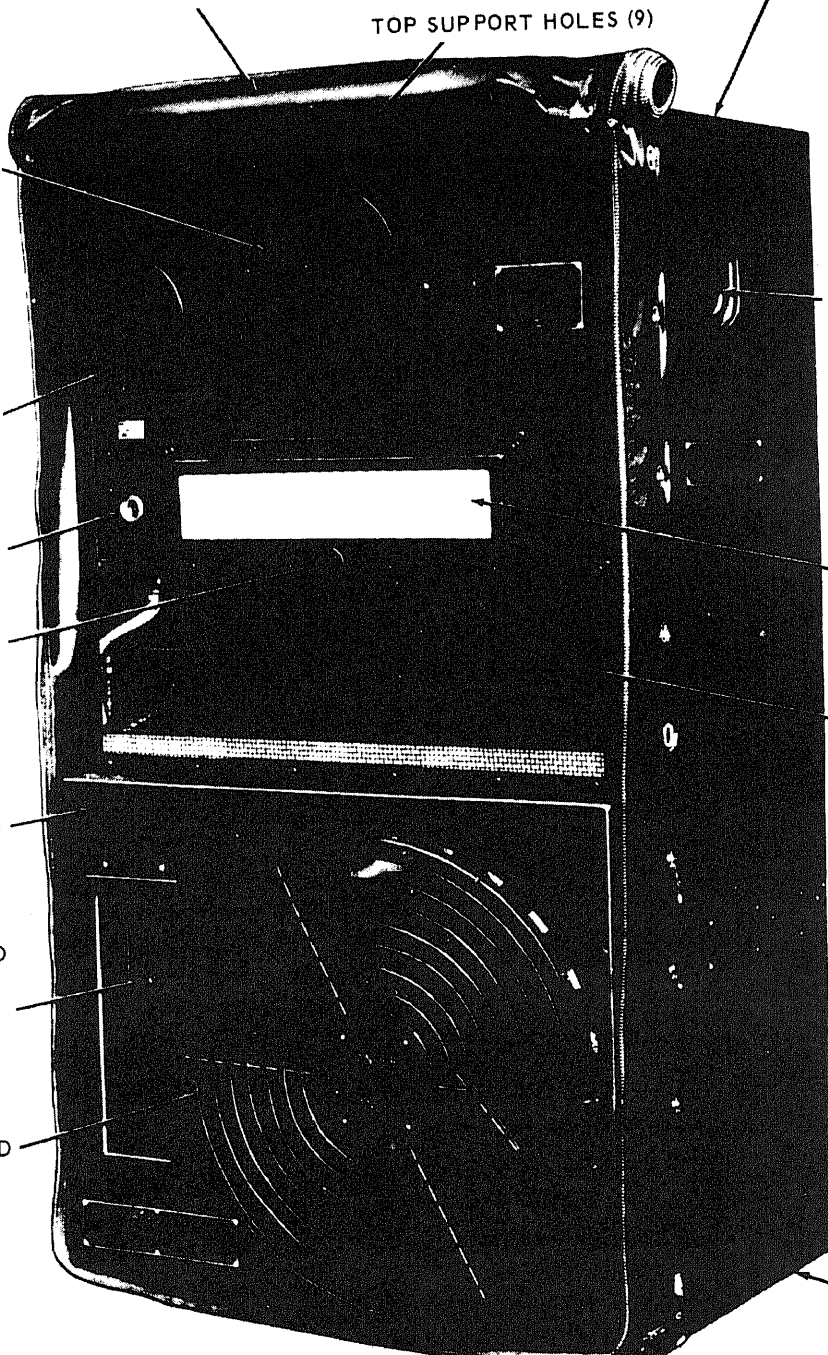
BACK PANEL  
AND MOTOR  
SUPPORT

HIGH AND  
LOW  
PRESSURE  
CUTOUT  
SWITCHES

FAN GUARD

CASING

BASE





Page 1-4. Paragraph 1-4a(3). Delete "This unit charged with 15.5 lbs refrigerant -22" and substitute: MAC4V40-3 Plate: THIS UNIT CHARGED WITH 14 LBS., 15 OZS. REFRIGERANT -22. MAC4V40-340-2 Plate: THIS UNIT CHARGED WITH 13 LBS., 8 OZ REFRIGERANT -22."

Page 1-5. Paragraph 1-4b(2)(d). In line 5 change "MAC 4V60-340-2" to read "MAC6V40-340-2".

Paragraph 1-4b(2)(f). In line 3 change part number, "3001X4" to read "3001X4-540".

Paragraph 1-4b(3)(f). In line 3 change part number "237AVIL-70327-142" to read "237AVIL-70237-142".

Page 1-6. Paragraph 1-4b(4)(c). In line 1 change "Metals and Controls, Inc." to read "Texas Instruments, Inc." In line 3 change part number "CWA 1249" to read "Type CWA 1249".

Paragraph 1-4b(4)(d). Change subparagraph title from "Magnetic contractors" to read "Relays". Change part number "9565H2B" to read "MS2419-2D1".

Paragraph 1-4b(4)(f). In line 3 change part number "71-212-5MG6" to read "71-212-2MG6".

Paragraph 1-4b(4)(i). In line 1 change "Reid Hill Electronics" to read "Milwaukee Transformer Co." In line 4 change part number "35666" to read "C1-14423". In line 5 change part number "35666" to read "C1-13490".

Paragraph 1-4b(1). In line 2 change part number "5JX100" to read "5JX100, Modified".

Pages 1-7 and 1-8. Figure 1-4 (Sheet 1 of 2) and Figure 1-4 (Sheet 2 of 2). The low pressure cutout switch S6 located in the upper right hand corner of the wiring diagram is in the closed position during normal operation of the air conditioner.

In line 46 of Legend, Part Number Column, change part number for the thermostat from "C13211E8301-1" to "C13211E8301-2".

Page 2-1. Paragraph 2-5. Add the following note

Page 2-6. Paragraph 2-11. Add subparagraph a: "and make sure the unit is properly stored (fig. 1-2)". Paragraph 2-11 is superseded:

c. If the air conditioner fails to operate, check the circuit breaker access cover (fig. 1-2) for the 4 screws and reset the circuit breaker.

Page 3-4. Figure 3-2—continue the Note: "Check top of unit for loose or broken attaching screws".

Page 3-5. Paragraph 3-10. This paragraph is superseded as follows:

### **3-10. Condenser Fan Guard and Screen.**

Paragraph 3-12. Add "fig. 2-2" after "Circuit Breaker" and "Push reset button" in the Possible remedy column.

Page 3-6. Paragraph 3-17. Delete the text from the Possible Remedy column: "Stop unit by turning selector switch to OFF, leave unit connected to power line." Add the following: "Turn selector switch to OFF, disconnect power to unit".

Page 3-7. Figure 3-3. Add "NOTE".

#### **NOTE**

1. Remove front access cover.
2. Partially remove junction box cover from control panel (fig. 3-16).
3. Tag electrical leads before disconnecting.

Page 3-9. Paragraph 3-27. This paragraph is superseded as follows:

### **3-27. Fresh Air Damper Control**

Subparagraph b is superseded as follows:

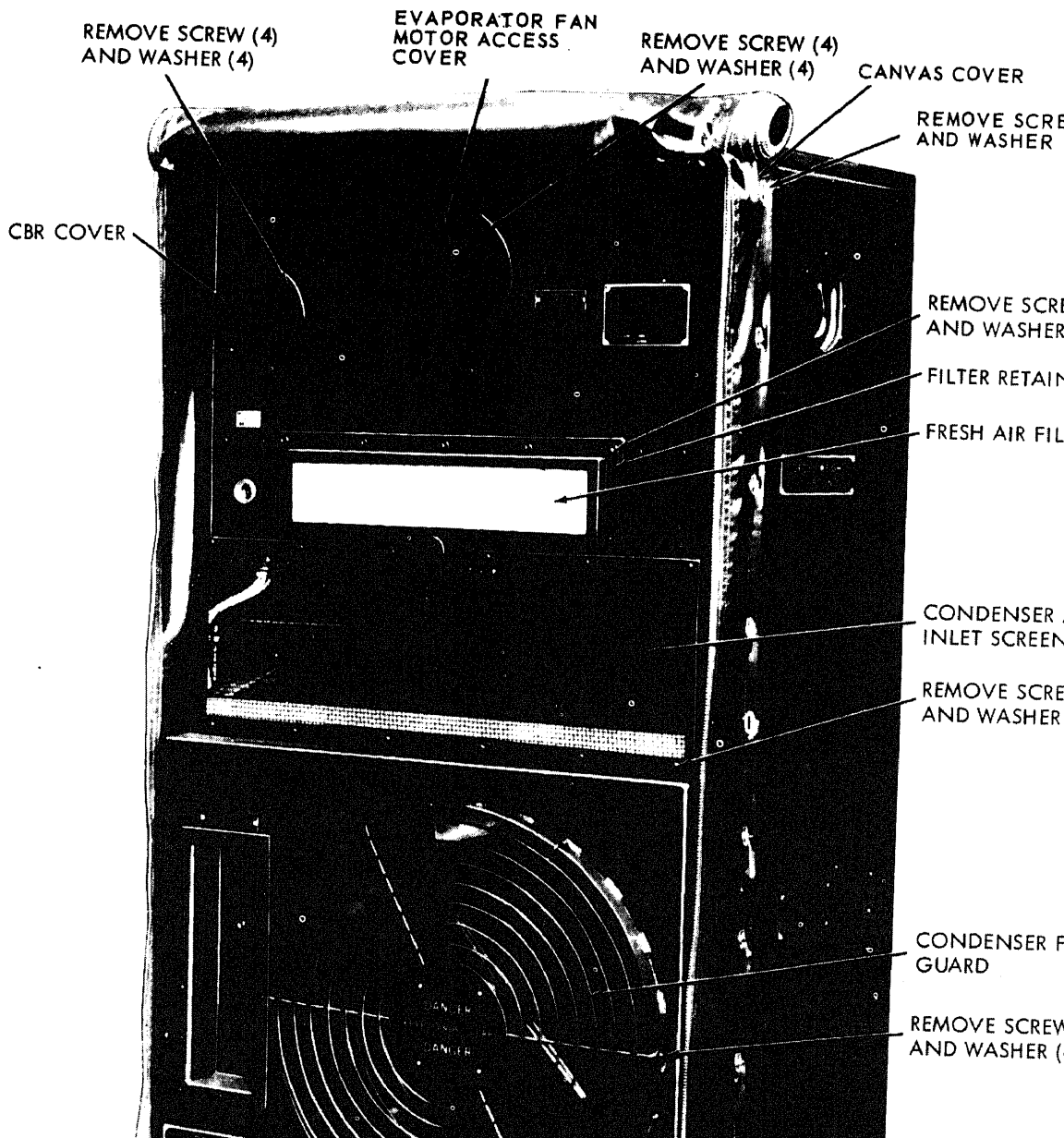
#### **b. Removal.**

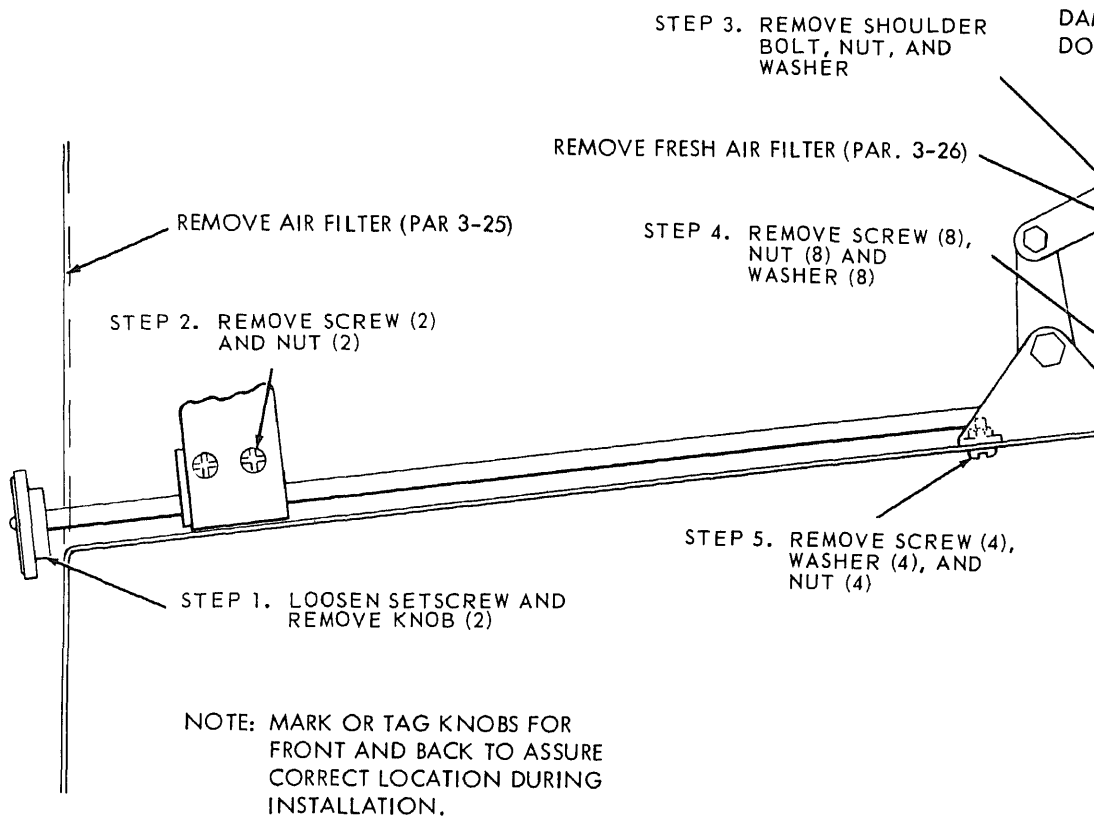
- (1) Remove fresh air filter

(2) Tighten self-locking nut (24) on long screw (23) that passes through worm gear assembly (28) until spring washers (27) begin to compress and place a firm drag on worm gear assembly when turning control rod (30).

*Page 3-10. Figure 3-5. Change (11) and washer (11)" to read "Rem and washer (12)".*

Page 3-14. Figure 3-8 is superseded as follows:





ME 4120-268

**Figure 3-9. Fresh air damper control, removal and installation.**

Page 3-18. Paragraph 3-31. Subparagraph b is superseded as follows:

b. *Maintenance Procedure.* Remove top panel, discharge and intake air grilles (para 3-24). Refer to figure 3-11 and perform prescribed maintenance services.

Page 3-20. Figure 3-12. Add the following:

**NOTE**

Remove front access cover (para 3-24).

Page 3-25. Figure 3-24. (Sheet 1 of 2). The

Add "Install top panel (para 3-24)" sentence to subparagraph d.

Page 3-38. Paragraph 3-53. Add "graph title."

Page 3-41. Paragraph 3-56. Add connector in first line of subparagraph. Delete subparagraph "d". Change subparagraph "e" to read "Delete the "Note" in its entirety."

Page 3-42. Paragraph 3-57. Sub

*Page 6-10* is changed as follows: Delete the "illustration" on left side of the figure. Add following "NOTE" to the illustration.

**NOTE**

Refer to paragraph 3-38 and remove back panel and motor support for access to pressure switches.

**NOTE**

Do not disconnect tubing nut (2) for electrical testing.

*Page 6-12.* Paragraph 6-18. The "NOTE" is superseded:

**NOTE**

Capacity of Refrigerant -22, FSN 6830-174-9677, in Model MAC4V40-340-3, system is 14 lbs. 15 ozs. and in Model MAC6V40-340-2 system is 13 lbs. 8 ozs.

*Page 6-18.* Figure 6-15. Step 3 is superseded as follows:

Step 3. Open refrigerant cap and access valve. (2-11) and weigh amount of refrigerant -22

*Page A-1.* Paragraph A-3. D 268-25P", and "Department of the list and substitute the following:

TM 5-4120-268-20P Department of Technical Manual Maintenance Special Tools

TM 5-4120-268-35P Department of Technical Manual General Support Maintenance Re Special Tool

*Page C-2.* Section II of the location Chart is superseded as follows:



[illegible]





*Page I-1.* Index. Change line 35 to read "Fresh air filter, CBR cover, motor access cover, fanguard and condenser air inlet screen. After line 36, condenser fan, add "Condenser fan guard and air inlet screen. para 3-10, page 3-5.

*Page I-2.* Index. Change line  
lows "Fresh air damper control".

By Order of the Secretary of the Army:

W. C. WESTMOR.  
*General, United States Army*  
*Chief of Staff.*

Official:

VERNE L. BOWERS,  
*Major General, United States Army,*  
*The Adjutant General.*

Distribution:

To be distributed in accordance with DA Form 12-25, Section III, (qty rqr block No. 544) organizational requirements for Air Conditioners; 36,000 BTU, Floor Mounting.

CHANGE }  
No. 2 }

HEADQUARTERS  
DEPARTMENT OF THE  
WASHINGTON, D. C., 2 Mar

**Operator, Organizational, DS, GS, and Depot Maintenance Manual**  
**AIR CONDITIONER, VERTICAL, COMPACT; FLOOR MOUNTED;**  
**36,000 BTU/HR COOLING, 30,000 BTU/HR HEATING**  
**208 VOLT, 3 PHASE, 50/60 CYCLE, (TRANE MODEL**  
**MAC 6V40-340-2) FSN 4120-935-5421; 208 VOLT,**  
**3 PHASE, 400 CYCLE (TRANE MODEL MAC 4V40-340-3)**  
**FSN 4120-935-5418**

TM 5-4120-268-15, 7 May 1969, is changed  
as follows:

Page 2-1, paragraph 2-3. Paragraph e is  
added as follows:

e. Maintenance and operating supplies  
for initial 8 hours of operation for the  
ditioner are contained in table 2-1.

*Table 2-1. Maintenance and Operating Supplies*

(1) Component Application	(2) Federal Stock Number	(3) Description	(4) Quantity Required F/Initial Operation	(5) Quantity Required F/8 Hrs Operation	(6) Notes
AIR FILTER	9150-753-4764	AIR FILTER ADHESIVE Oil, Lubricating Grade -30 1 qt can.	(1)	(1)	(1) Quantity required for stockage will be determined and authorized by the method of application and frequency required for proper servicing.
	4130-860-0042	Coater, Air Filter Adhesive 1 pt container.	(1)	(1)	

## APPENDIX B

### BASIC ISSUE ITEM LIST AND ITEMS TROOP INSTALLED OR AUTHORIZED

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#### Section I. INTRODUCTION

##### B-1. Scope

This appendix lists basic issue items, items troop installed or authorized which accompany the air conditioner and are required by the crew/operator for operation, installation, or operator's maintenance.

##### B-2. General

This basic issue items, items troop installed or authorized list is divided into the following sections:

*a. Basic Issue Items List—Section II.* Not applicable.

*b. Items Troop Installed or Authorized List—Section III.* A list in alphabetical sequence of items which at the discretion of the unit commander may accompany the end item, but are NOT subject to be turned in with the end item.

##### 3. Explanation of Columns

The following provides an explanation of the columns in the tabular list of Basic Issue Items, Section II, and Items Troop Installed or Authorized, Section III.

*a. Source, Maintenance, and Code(s) (SMR):* Not applicable.

*b. Federal Stock Number.* Indicates the Federal stock number of the item and will be used for requisitioning.

*c. Description.* This column includes the general item name and any additional information of the item required.

*d. Unit of Measure (U/M).* Phonetic abbreviation indicating the unit of measure of the quantity of the item upon which the cost is based, e.g., ft, ea, pr, etc.

*e. Quantity Authorized (Item or Authorized Only).* This column indicates the quantity of the item authorized for use with the equipment.



By Order of the Secretary of the Army:

Official:

CREIGHTON W. A  
*General, United States Army*  
*Chief of Staff*

VERNE L. BOWERS  
*Major General, United States Army,*  
*The Adjutant General.*

Distribution:

To be distributed in accordance with DA Form 12-25C, (qty rqr block No. 554) Organizational requirements for Environmental Equipment: air Conditioners, 36,000 BTU, Floor Mounting.

**Changes in force: C 1, C 2 and C 3**

**TM 5-4120  
C 3**

CHANGE }  
No. 3 }

HEADQUARTERS  
DEPARTMENT OF THE  
WASHINGTON, D.C., 12 Mar

**Operator's, Organizational, Direct Support,  
General Support and Depot Maintenance Manual  
AIR CONDITIONER, VERTICAL COMPACT FLOOR MOUNTED, 36,000  
BTU/HR COOLING, 30,000 BTU/HR HEATING, 208 VOLT, 3 PHASE, 50/60  
CYCLE, TRANE MODEL MAC6V40-340-2, NSN 4120-00-935-5421, 208 VOLT,  
3 PHASE, 400 CYCLE, TRANE MODEL MAC4V40-340-3,  
NSN 4120-00-935-5418**

TM 5-4120-268-15, 7 May 1969, is changed as follows:

The title is changed as shown above.

*Page 2 of cover.* Add the following warning to the list of safety precautions.

**WARNING**

The burning of polyurethane foams is dangerous. Due to the chemical composition of polyurethane foam, toxic fumes are released when it is burned or heated. If it is burned or heated indoors, such as during a welding operation in its proximity, precautions should be taken to adequately ventilate the area. An exhaust system equivalent to that of a paint spray booth should be used. Air supplied respirators, approved by the National Institute for Occupational Safety and Health of the U.S. Bureau of Mines, should be used for all welding in confined spaces and when ventilation is inadequate. Individuals who have chronic or recurrent respiratory conditions, including allergies and asthma, should not be employed in this type of environment.

By Order of the Secretary of the Army:

FRED C. WEYAND  
*General, United States  
Chief of Staff*

Official:

CHANGE }  
No. 4 }

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, D.C., 7 May 1969

**Operator's Organizational, Direct Support,  
General Support and Depot Maintenance Manual  
AIR CONDITIONER, VERTICAL COMPACT FLOOR MOUNTED, 36,000  
BTU/HR COOLING, 30,000 BTU/HR HEATING, 208 VOLT, 3 PHASE, 50/60  
CYCLE, TRANE MODEL MAC6V40-340-2, NSN 4120-00-935-5421, 208 VOLT  
3 PHASE, 400 CYCLE, TRANE MODEL MAC4V40-340-3,  
NSN 4120-00-935-5418**

TM 5-4120-268-15, 7 May 1969, is changed as follows:

Page 2-6, paragraph 2-11. Add the following caution before subparagraph a:

**CAUTION**

**To prevent refrigerant from condensing in crankcase and  
mixing with the oil, do not start unit in air condition mode of  
operation until power has been applied to unit for 4 hours.**

By Order of the Secretary of the Army:

Official:

**E. C. MEYER**  
*General, United States Army*  
*Chief of Staff*

**ROBERT M. JOYCE**  
*Brigadier General, United States Army*  
*The Adjutant General*



**OPERATOR, ORGANIZATIONAL, DS, GS, AND DEPOT MAINTENANCE MANUAL  
AIR CONDITIONER: VERTICAL COMPACT, FLOOR MOUNTED  
36,000 BTU/HR COOLING, 30,000 BTU/HR HEATING; 208  
VOLT, 3 PHASE, 50/60 CYCLE,  
(TRANE MODEL MAC6V40-340-2) FSN 4120-935-5421,  
208 VOLT, 3 PHASE, 400 CYCLE, (TRANE MODEL  
MAC4V40-340-3) FSN 4120-935-5418**

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	II. Movement to a new worksite	2-6, 2-
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	IV. Operator's maintenance	3-8-3
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# CHAPTER 1

## INTRODUCTION

---

### Section I. GENERAL

#### 1-1. Scope

a. This manual is published for use of personnel to whom Military Models MAC4V40-340-3 and MAC6V40-340-2 air conditioners are issued. Chapters 1 through 3 provide information on operation, preventive maintenance services, and organizational maintenance of the equipment, accessories, components, and attachments. Chapters 4 through 6 provide instructions for direct and general support and depot maintenance. Also included are description of main units and their relationship to other components.

b. Appendix A contains a list of reference publications applicable to this manual. Appendix B contains the list of Basic Issue Items authorized the operator of this equipment. The Organizational, Direct and General Support, and Depot Maintenance Repair Parts and Special Tools are listed and illustrated in TM 5-4120-268-25P (when printed). Appendix C contains the Maintenance Allocation Chart.

c. Numbers in parentheses on illustrations indicate quantity. Numbers preceding nomenclature

callouts on illustrations indicate preferred maintenance sequence.

d. Report of errors, omissions, and suggestions for improving this publication by individual user is encouraged. Forms submitted on DA Form 2028 (Changes to DA Publications) are forwarded to the Commanding General, Mobility Equipment Command, AMSME-MPP, 4300 Goodfellow Avenue, St. Louis, Mo. 63120.

e. Report all equipment improvement recommendations as prescribed by TM 38-750.

#### 1-2. Record and Report Forms

a. DA Form 2258 (Depreciation Report for Engineer Equipment).

b. For other record and report forms applicable to the operator and organization, refer to TM 38-750.

*Note.* Applicable forms, excluding DA Form 2258 (United States Government Motor Vehicle Identification Card) which is carried by the operator, will be kept in a canvas bag with the equipment.

### Section II. DESCRIPTION AND TABULATED DATA

#### 1-3. Description

b. *Condensing Section.* The

CONTROL PANEL

DISC

INT

INT

LO

DA

CC

PC

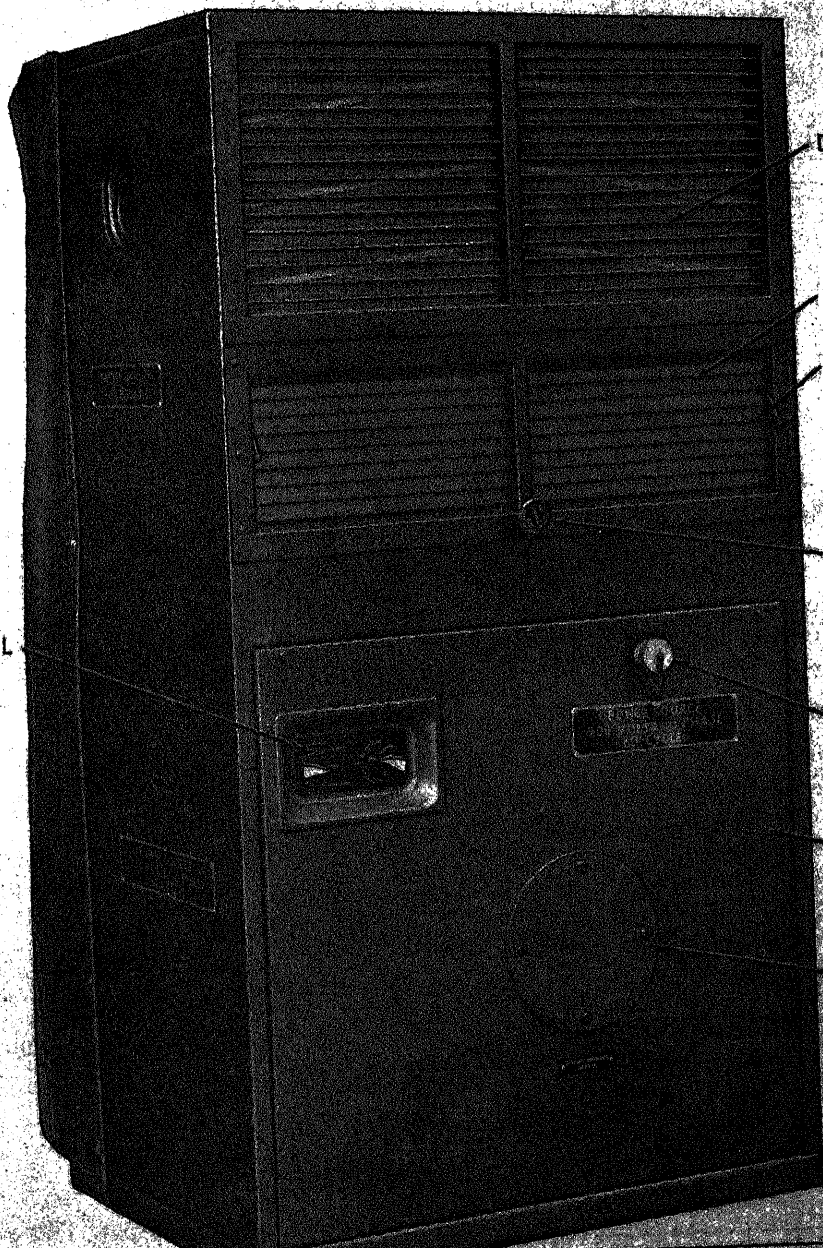
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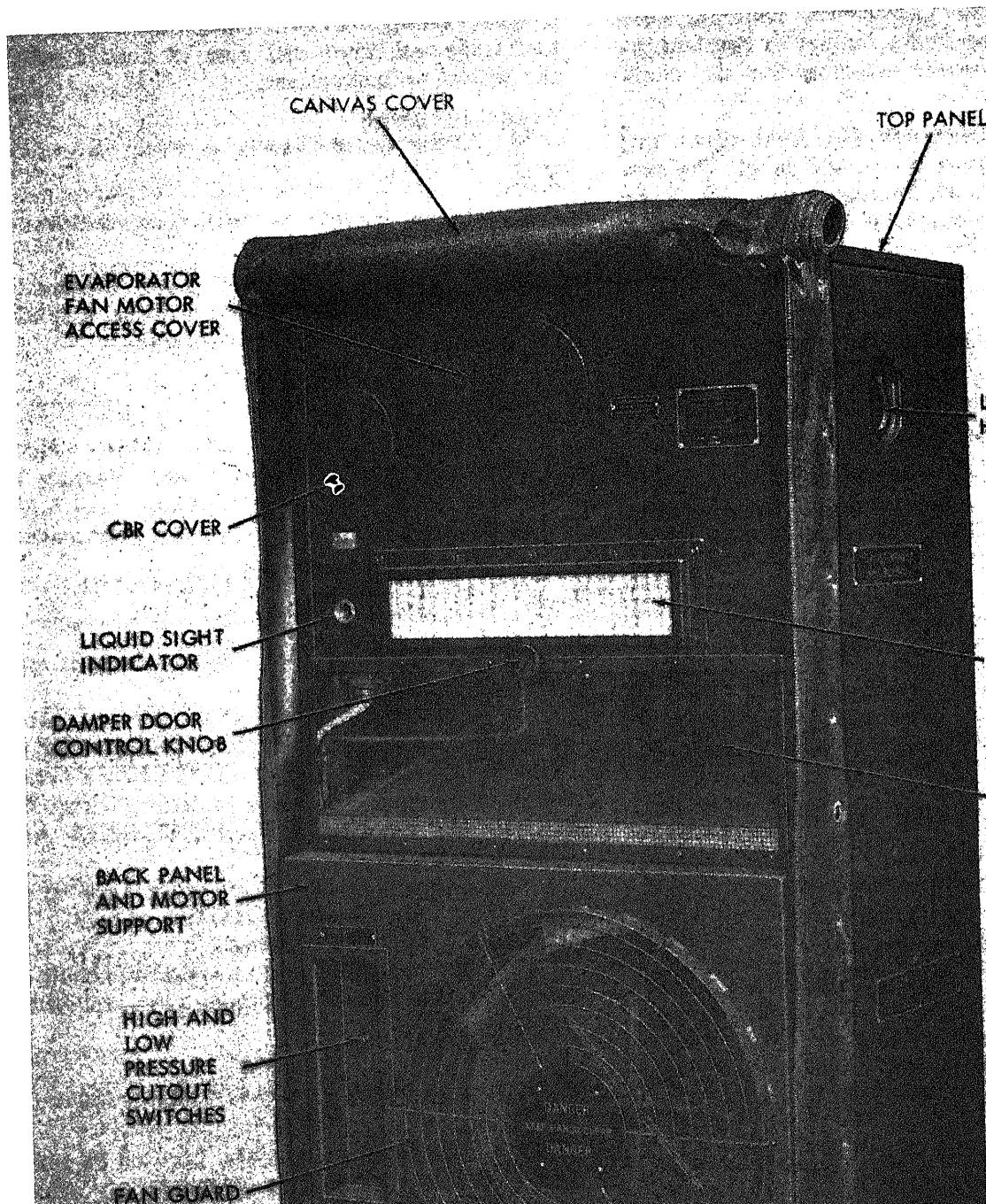
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PA

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A





CANVAS COVER

TOP PANEL

EVAPORATOR  
FAN MOTOR  
ACCESS COVER

CBR COVER

LIQUID SIGHT  
INDICATOR

DAMPER DOOR  
CONTROL KNOB

BACK PANEL  
AND MOTOR  
SUPPORT

HIGH AND  
LOW  
PRESSURE  
CUTOUT  
SWITCHES

FAN GUARD

valve, solenoid valve, electrical heaters, sight glass, accumulators, and a damper to regulate the amount of outdoor air entering the air conditioner.

*d. Locational References.* The front of the unit is the face containing the control panel. The condenser fan grille is at the rear of the unit. Right and left are determined by facing the front of the unit in the operator's position when operating the controls.

#### 1-4. Identification and Tabulated Data

*a. Identification.* The air conditioner has 14 major identification plates. The information contained on the plates is listed below.

(1) *Military identification plate.* Located near top of rear panel, contains the following information. Information listed is for the MAC-6V40 air conditioner.

U.S. ARMY  
AIR CONDITIONER, VERTICAL  
COMPACT, 36,000 BTU/HR  
208 VOLT, 3 PHASE, 60 CYCLE  
FSN 4120-935-5421  
PART NO. 97403-13214E3900  
MFD BY THE TRANE CO.  
CONTRACT NO.  
DATE  
SERIAL NO.—WT 460 lb.

The MAC4V40 plate contains the same information with the following exceptions.

400 CYCLE  
FSN 4120-935-5418  
PART NO. 97403-13214E4000  
WT 455 lbs.

(2) *Liquid sight indicator color change plate.* Located on rear panel above liquid sight indicator (fig. 1-2) contains the following information:

DRY (green band) CAUTION (chartreuse band)

(5) *Damper control plate.* Control knobs on front and rear the following instructions.

#### FRESH AIR DOOR

OPEN (arrow counterclockwise on rear)  
TURN  
CLOSE (arrow clockwise on front, rear).

(6) *Cutout switch reset plate.* Located on lower rear panel above reset knob. Contains the following resetting instructions:

HP	PUSH TO
CUTOUT	RESET

(7) *Power supply plate.* Mounted near power connection terminals at front rear and sides of unit. The MAC-6V40 plate contains the following information:

POWER SOURCE  
208 VOLTS, 3 PHASE  
60 CYCLES

The MAC4V40 plate is the same as the MAC-6V40 plate and specifies 400 CYCLES.

(8) *Control panel instruction plate.* Located on the front of the control panel. Contains instructions for TEMPERATURE INCREASE and DECREASE selector switch function controls: HEAT, LO HEAT, OFF, VENT, and COOL. See figure 2-1.

(9) *Circuit breaker access plate.* Located on lower front panel, indicates location of circuit breaker access opening.

(10) *Fan warning plate.* Located on condenser fan guard, contains the following warning:

DANGER  
KEEP HANDS CLEAR  
DANGER

(11) *Wiring diagram plate.*

**b. Tabulated Data.**

(1) *Air conditioner, compact, vertical, self-contained.*

Manufacturer ----- The Trane Company  
Models ----- MAC4V40-340-3 and  
MAC6V40-340-2

**Capacity:**

Cooling ----- 36,000 BTU/HR

**Heating:**

60 cycles ----- 30,000 BTU/HR

400 cycles ----- 33,000 BTU/HR

Ventilating ----- 1,300 CFM

(2) *Condensing section.*

(a) *Compressor.*

Manufacturer ----- The Trane Company  
Model ----- MJ4  
Type ----- Hermetically sealed,  
reciprocating

**Part Number:**

MAC4V40-340-3 ----- A4525-740-5

MAC6V40-340-2 ----- A4525-740-4

(b) *Condensing coil.*

Manufacturer ----- The Trane Company  
Type ----- Finned tube  
Part number ----- A4525-682

(c) *Condenser fan.*

Manufacturer ----- The Trane Company  
Type ----- Axial  
Part number ----- FAN 297

(d) *Condenser fan motor.*

Manufacturer ----- Welco Industries, Inc.  
Type ----- Induction, direct drive  
Part number:  
MAC4V40-340-3 ----- 7025-6  
MAC4V60-340-2 ----- 7015-4

(e) *Dehydrator.*

Manufacturer ----- Sporlan Valve Co.  
Type ----- Dessicant drier  
Part number ----- C164

(f) *Pressure relief valve.*

Manufacturer ----- Superior Valve & Fitting

(i) *Low pressure cutout*

Manufacturer ----- Penn Cont  
Type ----- Pressure c  
closed  
Part number ----- 210AP10A

(j) *System access valves*

Manufacturer ----- Superior V  
Co.  
Type ----- Diaphragm  
Part number ----- 5939X4  
Number per unit ----- 2

(3) *Evaporator section.*

(a) *Evaporator coil.*

Manufacturer ----- The Trane  
Type ----- Finned Tu  
Part number ----- A4525-668

(b) *Evaporator fans.*

Manufacturer ----- The Trane  
Type ----- Centrifuga  
Part number ----- FAN 296  
183 (RH  
Number per unit ----- 2

(c) *Evaporator fan motor*

Manufacturer ----- Welco Indu  
Type ----- Induction,  
double e  
Part number:  
MAC4V40-340-3 ----- 4715-22  
MAC6V40-340-2 ----- 926303

(d) *Air filters.*

Manufacturer ----- Edco Sales  
Alternate ----- Farr Co.  
Type ----- Permanent  
Part number:  
Return air ----- AL-18-4-  
Fresh air ----- AL-27.88-  
Alternate:  
Return air ----- A31547-1  
Fresh air ----- A31547-2  
Number per unit ----- 1 each

(e) *Expansion valves.*

Number per unit \_\_\_\_\_6

(h) *Sight glass.*

Manufacturer \_\_\_\_\_Sporlan Valve Co.  
Type \_\_\_\_\_Bulls-eye  
Part number \_\_\_\_\_SAK16

(4) *Electrical controls.*

(a) *Temperature control thermostat.*

Manufacturer \_\_\_\_\_Penn Controls, Inc.  
Type \_\_\_\_\_Bimetallic element, normal-  
ly closed  
Part number \_\_\_\_\_A19AGF-9

(b) *Selector switch.*

Manufacturer \_\_\_\_\_Cutler-Hammer, Inc.  
Type \_\_\_\_\_Rotary, five-position  
Part number \_\_\_\_\_8912K216

(c) *Heater thermostatic switch.*

Manufacturer \_\_\_\_\_Metals and Controls, Inc.  
Type \_\_\_\_\_Automatic reset, normally  
closed  
Part number \_\_\_\_\_CWA1249

(d) *Magnetic contactors.*

Manufacturer \_\_\_\_\_Cutler-Hammer, Inc.  
Type \_\_\_\_\_Three-pole, single throw  
Load capacity \_\_\_\_\_50 amperes      25 amperes  
Part number \_\_\_\_\_9565H94      9565H2B  
Number per unit \_\_\_\_\_1      3

(e) *Time delay relay.*

Manufacturer \_\_\_\_\_Dialtron Corp.  
Type \_\_\_\_\_Thermal delay, normally  
open  
Part number \_\_\_\_\_FR-305-NO-24

(f) *Circuit breaker, MAC4V40-340-3.*

Manufacturer \_\_\_\_\_Heinemann Electric Co.  
Type \_\_\_\_\_Manual reset  
Part number \_\_\_\_\_71-212-5MG6

(g) *Circuit breaker, MAC6V40-340-2.*

Manufacturer \_\_\_\_\_Heinemann Electric Co.  
Type \_\_\_\_\_Manual reset  
Part number \_\_\_\_\_71-212-4MG6

(h) *Fuses.*

Manufacturer \_\_\_\_\_Bussman Mfr. Co.

(k) *Rectifier.*

Manufacturer \_\_\_\_\_Syntr  
Type \_\_\_\_\_Silico  
Part number \_\_\_\_\_SS02

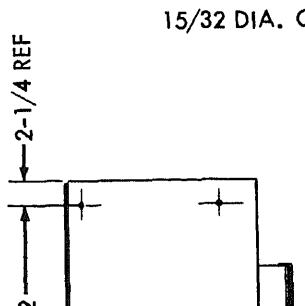
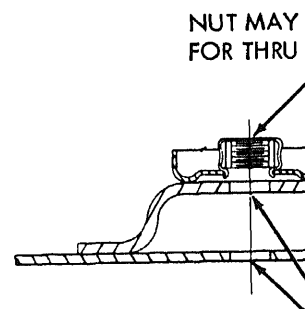
(l) *RFI Filters.*

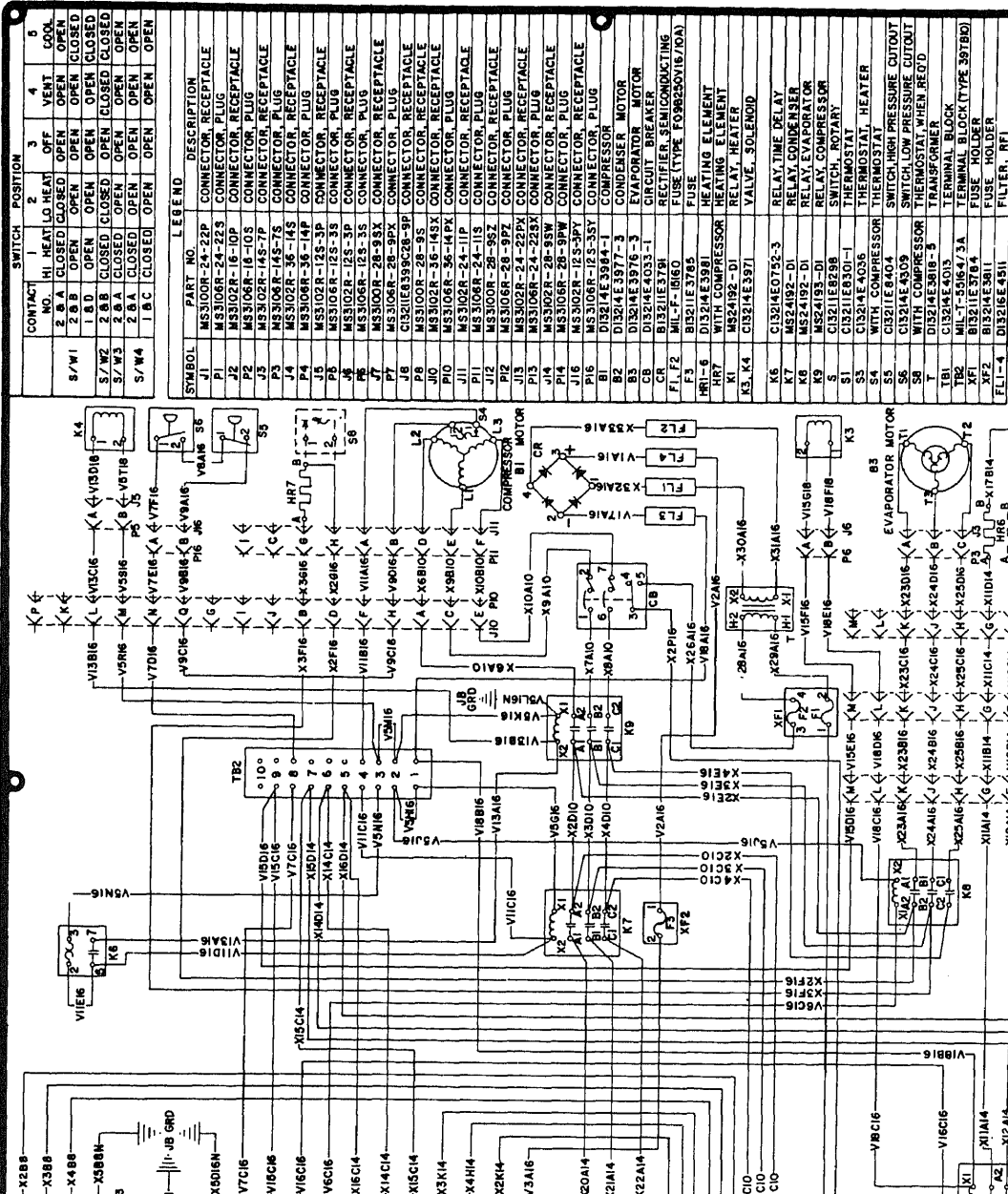
Manufacturer \_\_\_\_\_Sprag  
Part number \_\_\_\_\_5JX1  
Number per unit \_\_\_\_\_4

(5) *Dimensions and we*

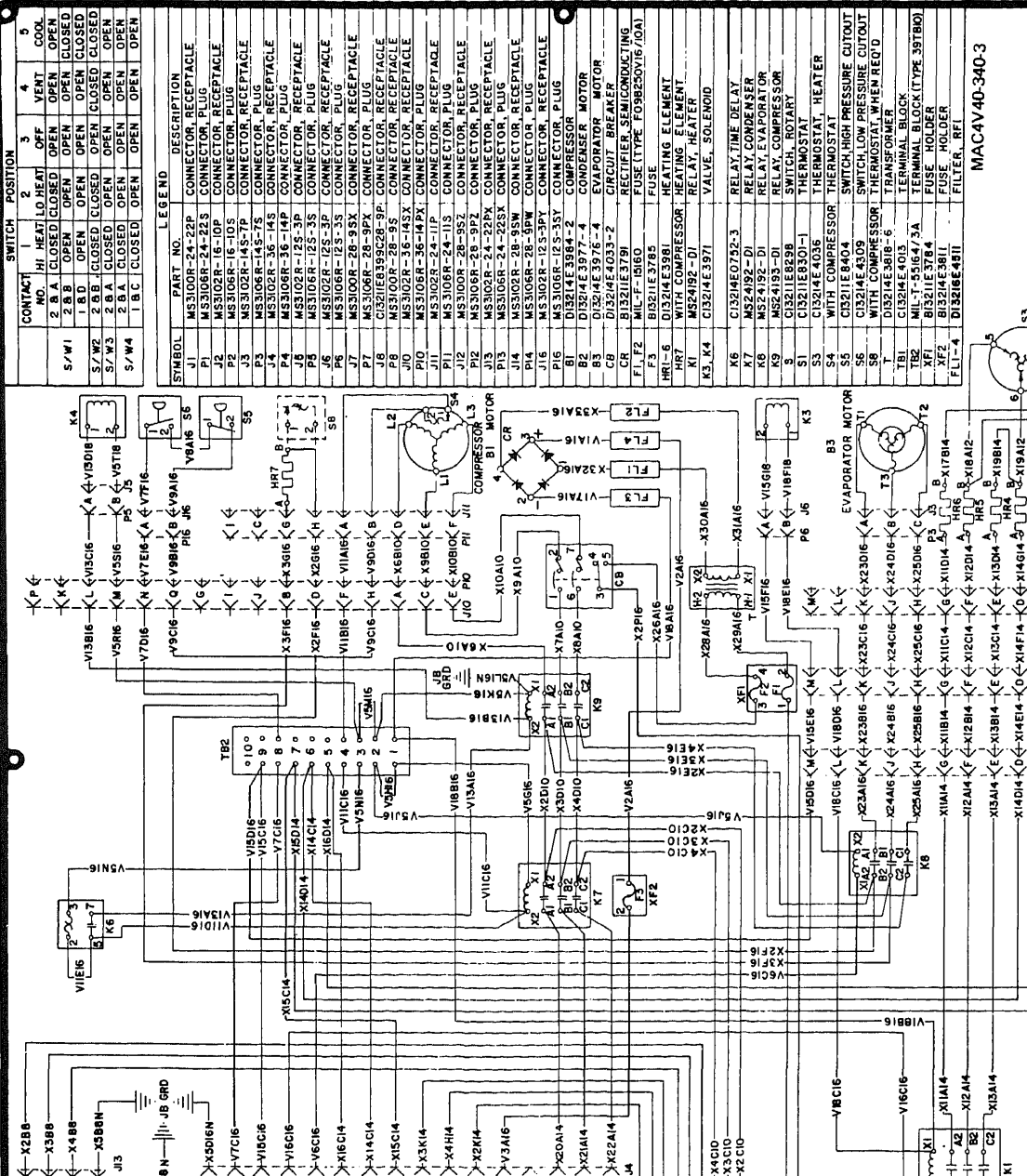
Length \_\_\_\_\_21 5/  
Width \_\_\_\_\_30 5/  
Height \_\_\_\_\_55 in  
Weight:  
MAC4V40-340-8 \_\_\_\_\_455 p  
MAC6V40-340-2 \_\_\_\_\_460 p

(6) *Base plan. Refer to plan.*









(7) *Wiring diagrams*. Refer to figure 1-4 for wiring diagrams.

(8) *Schematic wiring diagram*. Refer to figure 1-5 for schematic wiring.

### **1-5. Difference in Models**

This manual covers the Trane MAC4V40-340-3 and MAC6V40-340-2 air conditioners. The differences between the two air conditioners are in

the electrical system. Model M... designed to operate from a 40... 3 phase supply. Model MAC6V... signed to operate from a 50/60... 3 phase supply. Where differ... model is covered separately in a... nance section of this manual.

*Figure 1-5. Schematic wiring*  
(Located in back of n...

## CHAPTER 2

# INSTALLATION AND OPERATION INSTRUCTIONS

---

### Section I. SERVICE UPON RECEIPT OF EQUIPMENT

#### 2-1. Unloading the Equipment

a. Remove any blocking or tiedowns that may have been used to secure the item to carrier. The air conditioner is shipped in a wooden carton, the base of which is raised to provide for insertion of tongs of a fork.

b. Use a forklift or other suitable lifting device to remove unit from carrier.

**Caution:** Use care in handling to avoid damaging the air conditioner.

#### 2-2. Unpacking the Equipment

a. *General.* Move air conditioner to installation site before removing shipping container. Cut the metal bands and remove top, end, and sides of carton, and the covering. Remove bolts securing base of unit to crate. Using a suitable hoist or crane and a spreader bar attached to the lifting handles, lift unit from crate.

b. *Depreservation.* Prior to placing unit in operation, accomplish depreservation in accordance with instructions outlined in DA Form 2258 (Depreservation Guide of Engineer Equipment). DA Form 2258 is attached on or near the operational controls.

#### 2-3. Inspecting and Servicing Equipment

a. Perform daily preventive maintenance serv-

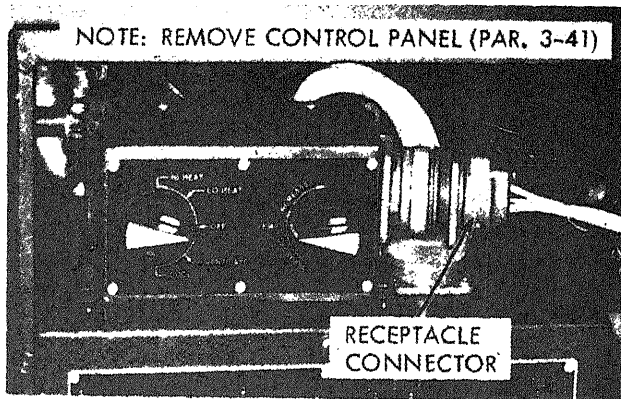
tions it may become desirable to remove the front panel in a remote location and install the remote control blockoff plate.

b. *Blockoff Plate.* The blockoff plate is provided for installation when the unit is moved for remote control operation. The blockoff plate provided must be used. The unit will enter the lower compartment when the unit is in Figure 2-1, and install the blockoff plate.

#### 2-5. Installation or Setting-Up

a. *General.* Set air conditioner in position to allow proper condensation. Condensation will be satisfactory with a slight angle, and using one (1) inch drain connections).

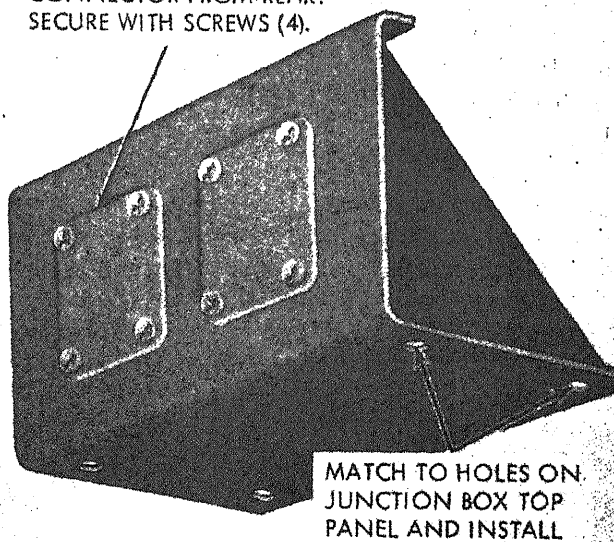
b. *Locating the Unit.* The front panel and evaporator fan take grilles must be accessible for cleaning and maintenance. The condenser discharge openings must always be clear to allow sufficient air for condensation. The evaporator fan discharge openings at front of unit should be free to permit maximum unit capacity. Adequate headroom must be allowed for the unit and the eliminator.



NOTE: CONNECT CONTROL PANEL AND RECEPTACLE CONNECTOR WITH SUITABLE CABLE.

NOTE: AN ALTERNATE REMOTE CONTROL CONNECTION OPENING IS LOCATED IN THE LOWER REAR PANEL.

REMOVE COVER PLATE AND INSTALL RECEPTACLE CONNECTOR FROM REAR. SECURE WITH SCREWS (4).



#### d. Power Source.

(1) *Model MAC4V40-3.*  
208 volt, 400 cycle, 3 phase

(2) *Model MAC6V40-3.*  
208 volt, 50/60 cycle, 3 phase

(3) *Power receptacle c*  
3100R24-22P receptacle is located at the top of the unit, at the top of the rear panel. Connect the proper electrical source to this receptacle using a plug or acceptable alternate. The power connections are provided at the rear of the unit; any location for interchanging the power receptacle is provided on the unit and one of the cover plates is located at the rear of the unit. Be sure to cover unused location at front of unit to prevent air from being drawn through.

#### e. Remote Control.

(1) *General.* The control panel is removed from the unit and used as a remote control for operation of the air conditioning unit. The remote control connection and the control panel must be used when the unit is used as a remote control.

(2) *Remote control connection.*

(a) Disconnect power source.

(b) Refer to figure 2 for remote control connection.

truck or dolly using the recessed handles at sides of unit. Move unit to new worksite.

*Note.* Use a spreader bar whenever unit is hoisted with a crane.

*c. Long Distance Movement.* Crate the air conditioner, providing adequate protection to grilles

and control panel. Provide suitable tie-downs to prevent unit from transfer.

## **2-7. Reinstallation After Move**

Reinstall the air conditioner as in graph 2-5.

## **Section III. CONTROLS AND INSTRUMENTS**

### **2-8. General**

This section describes, locates, illustrates, and furnishes the operator, crew or organizational maintenance personnel sufficient information about the various controls and instruments for proper operation of the air conditioner.

### **2-9. Controls and Instruments**

*a. Controls and Instruments.* The controls and instruments on the air conditioner are illustrated on figure 2-2.

*b. High Pressure Cutout Control.* The high pressure cutout located at the rear of the unit is designed to sense discharge line pressure at the compressor and will cutout at 445 psig (pounds per square inch gage). When discharge line pres-

sure has reduced to 400 psi, the cutout control can be reset by pressing the reset button (fig. 2-2).

*c. Low Pressure Cutout Control.* The low pressure cutout located at the rear of the unit is designed to sense suction line pressure at the compressor and will cutout at 7 psi. When suction line pressure has increased above 7 psi, the low pressure cutout control can be reset by pressing the reset button (fig. 2-2).

*d. Liquid Sight Indicator.* The liquid sight indicator (fig. 2-2) indicates dryness of the refrigerant. Moisture in the refrigerant is shown by the indicator turning from green to yellow. The amount of refrigerant is indicated by bulb position.

INTAKE GRILLE  
LOUVER CONTROL  
(2) NORMALLY  
POSITIONED FOR  
REQUIRED TYPE OF  
AIR CONDITIONING.  
RAISE LEVER TO  
OPEN DAMPER.

DAMPER DOOR  
CONTROL KNOB (2)  
NORMALLY POSI-  
TIONED FOR REQUIRED  
TYPE OF AIR CONDIT-  
IONING. TURN KNOB TO  
OPEN DAMPER.

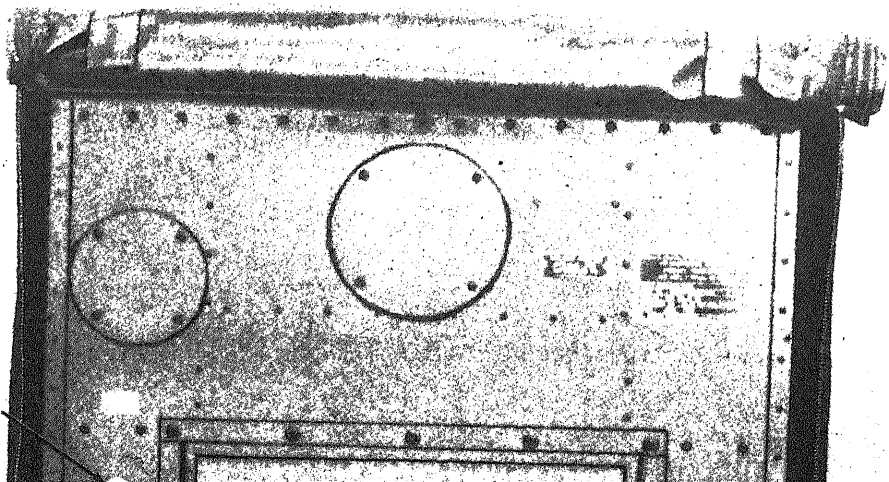
SELECTOR SWITCH  
NORMALLY POSI-  
TIONED FOR RE-  
QUIRED TYPE OF  
AIR CONDITIONING.

TEMPERATURE CON-  
TROL KNOB (2)  
NORMALLY POSI-  
TIONED FOR REQUIRED  
TEMPERATURE. TURN  
CLOCKWISE TO IN-  
CREASE OR COUNTER-  
CLOCKWISE TO DE-  
CREASE TEMPERATURE.

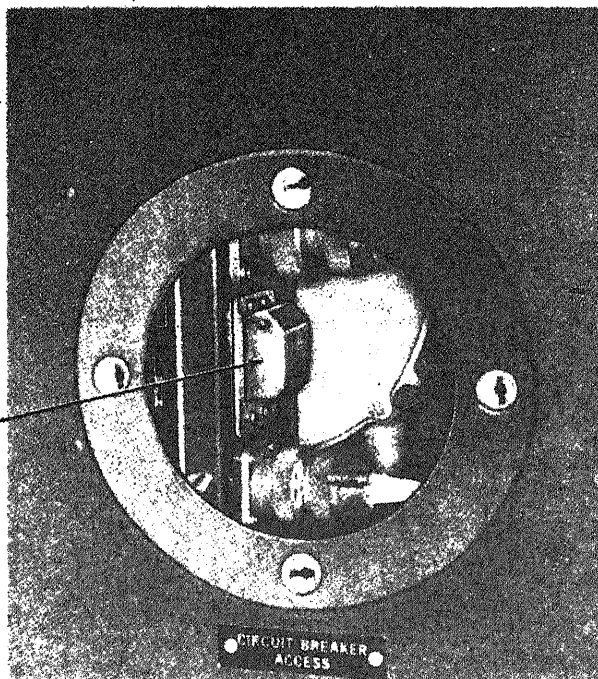
POWER SOURCE  
208 VOLTS 3 PHASE  
60 CYCLES

A

LIQUID SIGHT  
INDICATOR



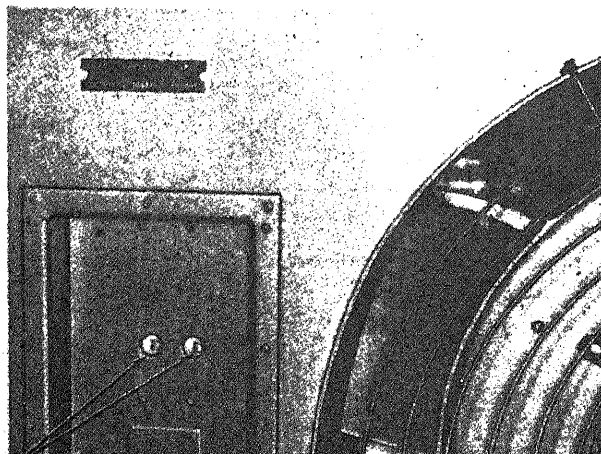
CIRCUIT BREAKER  
RESET LEVER



NOTE: MOVE  
POSITI  
CIRCU

NOTE: BEFORE  
WAIT 5

C



NOTE: PUSH B  
TO RES  
AND LO  
SURE C

NOTE: BEFORE  
WAIT 2

## Section IV. OPERATION OF EQUIPMENT

### 2-10. General

a. The instructions in this section are published for the information and guidance of personnel responsible for operation of the air conditioner.

b. The operator must know how to perform every operation of which the air conditioner is

capable. This section gives instructions for starting, stopping, and operating the air conditioner. Since nearly every situation presents a different problem, the operator must vary given procedure to fit the situation. Operating control settings are listed in Table 2-1.

Table 2-1. Operating Control Settings

Type of air conditioning required	Temperature control setting	Indoor return air louvers	Outdoor air damper	Seasonal position
Cooling—100% Recirculated Air	Desired Temperature	Open	Closed	COOL
Cooling—With Fresh Makeup Air	Desired Temperature	Partially * Closed	Open	COOL
Cooling—With Fresh Makeup Air Drawn Through CBR Filter (Outdoor Air Contaminated)	Desired Temperature	Open	Closed	COOL
Heating—100% Recirculated Air	Desired Temperature	Open	Closed	LO-HI HI-HI
Heating—With Fresh Makeup Air	Desired Temperature	Partially * Closed	Open	LO-HI HI-HI
Heating—With Fresh Makeup Air Drawn Through CBR Filter (Outdoor Air Contaminated)	Desired Temperature	Open	Closed	LO-HI HI-HI
Ventilation—Maximum Outdoor Air	Any	Closed	Open	VENT

\*Partial closing of the indoor return air louvers causes a greater portion of the total air flow to be drawn from the outside.

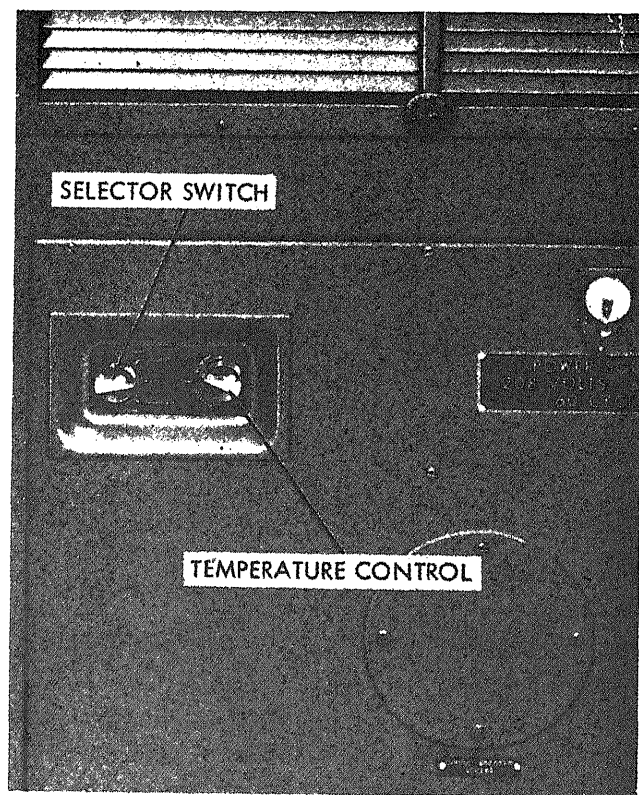
### 2-11. Starting

a. Perform daily preventive maintenance services (para 3-6).

### 2-13. Air Conditioner Operation

Refer to figure 2-5, for instructions for the operation of the air conditioner.





NOTE: BEFORE RESTART, WAIT 5 MINUTES.

STEP 1. POSITION TEMPERATURE CONTROL FOR DESIRED TEMPERATURE.

STEP 2. PLACE SELECTOR SWITCH ON "COOL" POSITION FOR COOLING OPERATION, ON "LO HEAT" OR "HI HEAT" POSITIONS FOR HEATING, OR ON "VENTILATE" FOR VENTILATING OPERATION.

ME 4120-268-15/2-3

Figure 2-3. Starting instructions.

**Caution:** Do not disturb the cold weather unless absolutely necessary. Low temperatures make wiring and insulation easily broken.

## 2-15. Operation in Extreme Heat

a. *General.* The air conditioner operate satisfactorily at temperatures up to 125°F.

b. *Ventilation.* Allow sufficient ventilation for the air conditioner for adequate air flow.

*Note.* Do not restrict the flow of air through the intake and discharge openings of the unit.

## 2-16. Operation in Dusty or Sandy Conditions

Clean the condenser coil and evaporator coil weekly or more often if necessary. Clean the air filter, eliminator, air conditioning filters, and condenser screen daily.

## 2-17. Operation Under Rainy or Humid Conditions

If the unit is outside and not protected by dampers and air inlet door. Protect the unit with the canvas cover (fig. 2-6) during dry periods. Open access covers to allow unit to dry before operating. Exercise caution when operating electrical equipment in damp or wet areas to avoid shock.

## 2-18. Operation in Salt Water Air

Wash the exterior of the unit with fresh water at frequent intervals. Do not use salt water on electrical equipment during the cleaning operation. Coat exposed metal surfaces with a protective material. Remove corrosion and scale from exposed metal surface.

SELECTOR SWITCH

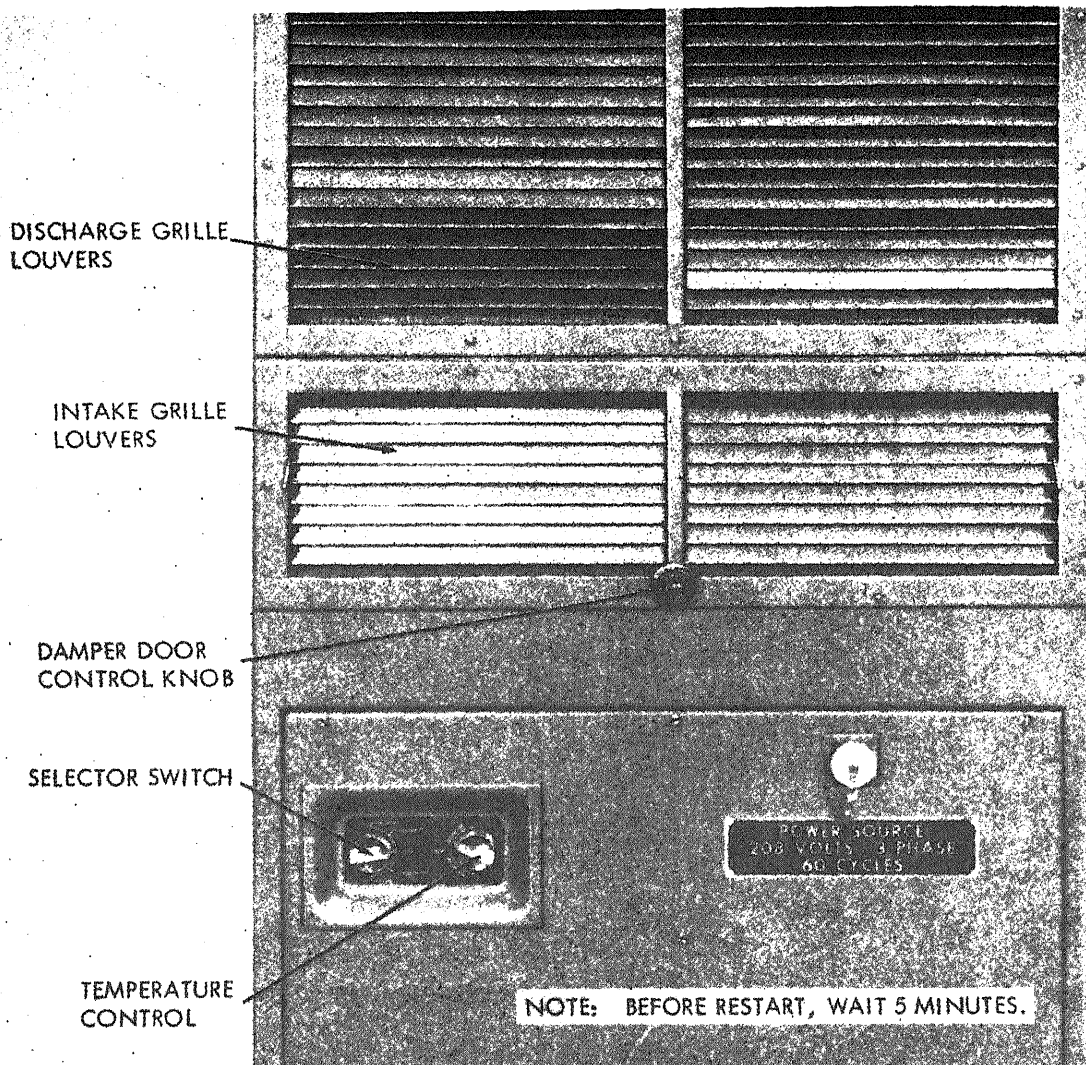
PLACE SELECTOR  
SWITCH IN "OFF"  
POSITION

CAUTION: BEFORE RESTART,  
WAIT 5 MINUTES.

CAUTION: TO PREVENT REFRIGERANT FROM CONDENSING IN  
CRANKCASE AND MIXING WITH THE OIL, DO NOT  
DISCONNECT THE UNIT FROM POWER SOURCE DURING  
THE SHUTDOWN PERIOD.

ME

Figure 2-4. Stopping instructions.



#### A. COOLING OPERATION:

- STEP 1. POSITION TEMPERATURE CONTROL FOR DESIRED TEMPERATURE.
- STEP 2. ADJUST DISCHARGE GRILLE LOUVERS FOR DESIRED CONDITIONED AIR DELIVERY PATTERN.
- STEP 3. ADJUST INTAKE GRILLE LOUVERS AND DAMPER DOOR AS INSTRUCTED IN TABLE 2-1.
- STEP 4. PLACE SELECTOR SWITCH ON "COOL" POSITION.

#### B. HEATING OPERATION:

CANVAS COVER



## CHAPTER 3

### OPERATOR AND ORGANIZATIONAL MAINTENANCE

### INSTRUCTIONS

---

#### Section I. SPECIAL TOOLS AND EQUIPMENT

##### 3-1. Special Tools and Equipment

No special tools or equipment are required by the operator or organizational maintenance personnel for maintenance of the air conditioner.

##### 3-2. Basic Issue Tools and Equipment

Tools and repair parts issued with the air conditioner are listed on the Basic Issue Items List, appendix B of the manual.

#### Section II. LUBRICATION

##### 3-3. General Lubrication Information

The air conditioner fan motors and compressor are lubricated and sealed by the manufacturer. No additional lubrication is required.

##### 3-4. Detailed Lubrication Information

Although the air conditioner requires no lubrication

for the fan motors, operation of the dampers will be assisted by periodic lubrication. Apply a few drops of light oil to all pivot points and linkage surfaces. During cold weather, clean off all accumulated oil before applying. Use graphite for lubrication of the damper rods as lined above.

#### Section III. PREVENTIVE MAINTENANCE SERVICES

##### 3-5. General

To insure that the air conditioner is ready for operation at all times, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance services to be performed are listed and described in paragraphs 3-5.1 through 3-5.7. The following are the minimum requirements for preventive maintenance services.

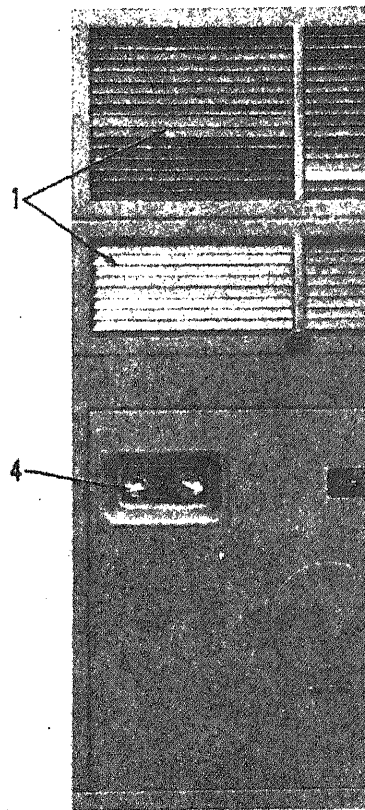
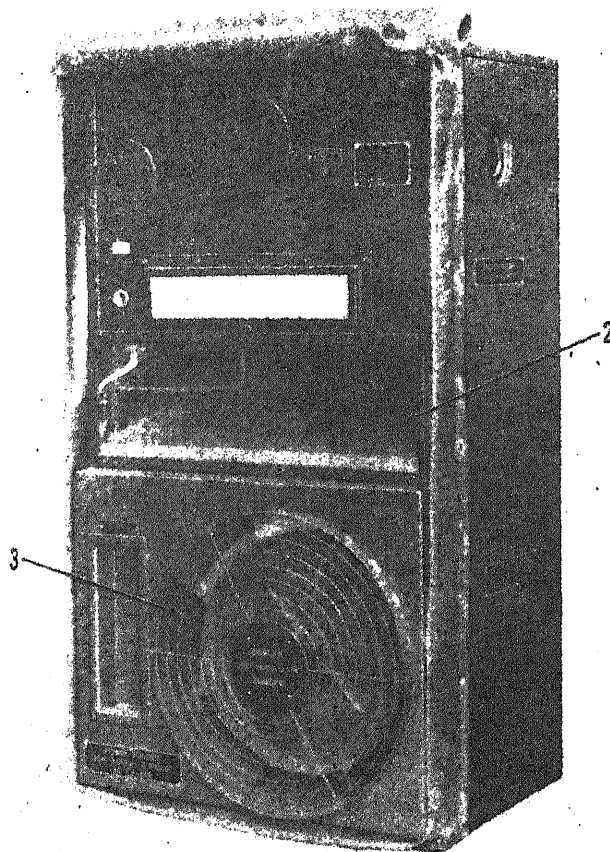
##### 3-6. Daily Preventive Maintenance

This paragraph contains an illustration of the preventive maintenance services which must be performed by the operator. The item numbers are listed consecutively to indicate the sequence of minimum requirements. Refer to figure 3-1 for daily preventive maintenance services.

# PREVENTIVE MAINTENANCE SERVICE DAILY

TM 5-4120-268-15

TRANE MODELS MAC4V40-340-3 & MAC6V40-340-2



ITEM



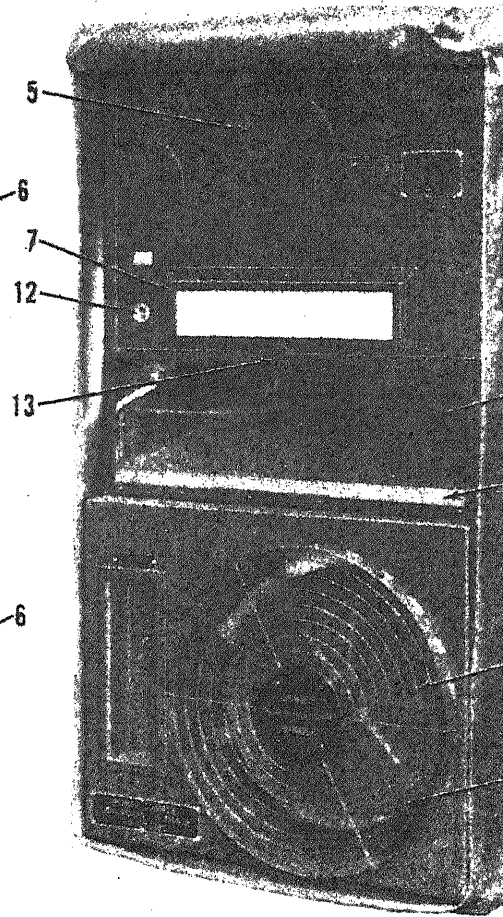
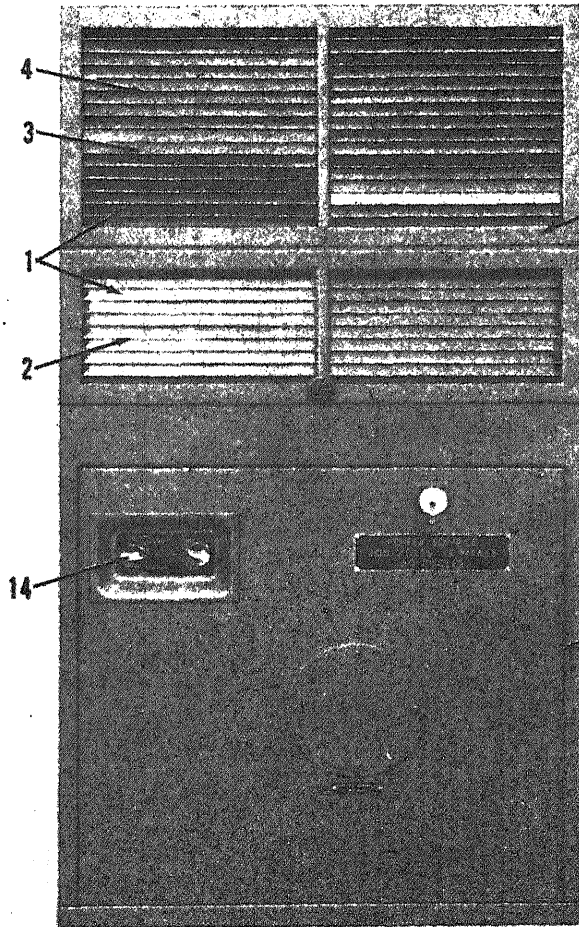
# PREVENTIVE MAINTENANCE SERVICES

## QUARTERLY

TM 5-4120-262-15

TRANE MODELS MAC4V40-340-3 & MAC6V40-340-2

AIR



ITEM

ITEM	
5	EVAPORATOR FAN. Clean fan blades. Tighten mounting setscrews. Tighten loose motor mounting screws. Check for bent or broken fans. Replace defective fan.
6	DRAIN PAN AND PIPING. Clean drain pan and drain piping. Inspect check valve for proper operation.
7	FRESH AIR FILTER. Clean fresh air filter.
8	INTAKE SCREEN. Clean condenser intake screen. Tighten loose mounting screws. Replace broken screen.
9	CONDENSER COIL. Clean condenser coil. Tighten loose mounting screws.
10	FAN GUARD. Clean fan guard. Tighten loose mounting screws.
11	CONDENSER FAN. Clean fan blade. Tighten mounting setscrews. Tighten loose motor mounting screws. Check for bent or broken fan blade. Replace defective fan.
12	LIQUID SIGHT INDICATOR. Check for damage or broken glass. Check for full condition of refrigeration system and for moisture in system.
13	DAMPER CONTROL. Check for proper operation. Replace defective parts.
14	CONTROLS. Check for damage and faulty operation. Replace damaged or defective controls.
	NOTE: OPERATION. During operation observe any unusual noise or vibration.



## Section IV. OPERATOR'S MAINTENANCE

### 3-8. General

The instructions in this section are published for the information and guidance of the operator to maintain the air conditioner.

**Warning:** Disconnect the air conditioner from the power source before performing any maintenance on the components of this unit.

### 3-9. Air Intake and Discharge Grilles

*a. General.* The intake grille (fig. 1-1) is an adjustable grille located in the front of the air conditioner. Louvers may be adjusted open, closed or any position in between by operation of control levers located on the right and left sides of the grille. Louvers of the discharge grille direct the flow of the conditioned air leaving the air conditioner.

*b. Maintenance.* Clean the louvers with a proved cleaning solvent and remove any obstructions that may interfere with the flow of air and from the air conditioner. Check and clean the intake louvers. Tighten loose mounting screws.

### 3-10. Condenser Fan Guard and Air Discharge Screen

*a. General.* The condenser fan guard is covered by an intake screen to prevent entry of airborne objects into the air passage. A fan guard (fig. 1-2) is located in the condenser fan air discharge to protect personnel from the revolving fan.

*b. Maintenance.* Brush dirt and debris from matter from screen and guard. Inspect for damage. Tighten loose mounting screws. Clean screen and guard with an approved solvent.

## Section V. TROUBLESHOOTING

### 3-11. General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the air conditioner and its components. Each trouble symptom stated is followed by a list of probable causes of the trouble. The possible remedy recommended is described opposite the probable cause. Any trouble beyond the scope of organizational maintenance shall be reported to direct support maintenance.

### 3-12. Compressor Fails to Start

Probable cause	Possible remedy
Power line failure -----	Restore power.
Selector switch improperly set.	Set selector switch to "COOL".
Circuit breaker tripped -----	Reset circuit breaker.

Probable cause	Possible remedy
Defective compressor motor protective relay.	Test relay (para 3-47). Refer to maintenance manual for defective relay.
Open or shorted control circuits.	Perform corrective action (para 3-47). Replace defective component.
Defective compressor motor	Test compressor motor (para 6-1). Refer to support maintenance manual for motor is defective.
Defective control circuit transformer.	Test transformer (para 47). Replace defective transformer.
Defective control circuit rectifier.	Test rectifier (para 3-21). Replace defective rectifier.
Defective RFI filters -----	Test filters (para 3-21). Replace defective filters.

ITEM	
5	EVAPORATOR FAN. Clean fan blades. Tighten mounting setscrews. Tighten loose motor mounting screws. Check for bent or broken fans. Replace defective fan.
6	DRAIN PAN AND PIPING. Clean drain pan and drain piping. Inspect check valve for proper operation.
7	FRESH AIR FILTER. Clean fresh air filter.
8	INTAKE SCREEN. Clean condenser intake screen. Tighten loose mounting screws. Replace broken screen.
9	CONDENSER COIL. Clean condenser coil. Tighten loose mounting screws.
10	FAN GUARD. Clean fan guard. Tighten loose mounting screws.
11	CONDENSER FAN. Clean fan blade. Tighten mounting setscrews. Tighten loose motor mounting screws. Check for bent or broken fan blade. Replace defective fan.
12	LIQUID SIGHT INDICATOR. Check for damage or broken glass. Check for full condition of refrigeration system and for moisture in system.
13	DAMPER CONTROL. Check for proper operation. Replace defective parts.
14	CONTROLS. Check for damage and faulty operation. Replace damaged or defective controls.
	NOTE: OPERATION. During operation observe any unusual noise or vibration.

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### 3-8. General

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**Warning:** Disconnect the air conditioner from the power source before performing any maintenance on the components of this unit.

### 3-9. Air Intake and Discharge Grilles

*a. General.* The intake grille (fig. 1-1) is an adjustable grille located in the front of the air conditioner. Louvers may be adjusted open, closed or any position in between by operation of control levers located on the right and left sides of the grille. Louvers of the discharge grille direct the flow of the conditioned air leaving the air conditioner.

*b. Maintenance.* Clean the louvers with a proper cleaning solvent and remove any obstructions that may interfere with the flow of air and from the air conditioner. Check and clean the intake louvers. Tighten loose mounting screws.

### 3-10. Condenser Fan Guard and Intake Screen

*a. General.* The condenser fan guard and intake screen is covered by an intake screen which prevents entry of airborne objects into the condenser air passage. A fan guard (fig. 1-2) is located in the condenser fan air discharge duct to protect personnel from the revolving fan blades.

*b. Maintenance.* Brush dirt and debris from the matter from screen and guard. Inspect for damage. Tighten loose mounting screws. Clean screen and guard with an appropriate solvent.

## Section V. TROUBLESHOOTING

### 3-11. General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the air conditioner and its components. Each trouble symptom stated is followed by a list of probable causes of the trouble. The possible remedy recommended is described opposite the probable cause. Any trouble beyond the scope of organizational maintenance shall be reported to direct support maintenance.

### 3-12. Compressor Fails to Start

Probable cause	Possible remedy
Power line failure	Restore power.
Selector switch improperly set.	Set selector switch to "COOL".
Circuit breaker tripped	Reset circuit breaker.

Probable cause	Possible remedy
Defective compressor motor protective relay.	Test relay (para 3-47). Replace defective relay.
Open or shorted control circuits.	Perform continuity test (para 3-47). Replace defective components.
Defective compressor motor	Test compressor (para 6-1). Support maintenance. Motor is defective.
Defective control circuit transformer.	Test transformer (para 47). Replace defective transformer.
Defective control circuit rectifier.	Test rectifier (para 3-21). Replace defective rectifier.
Defective RFI filters	Test filters (para 3-21). Replace defective filters.

Probable cause	Possible remedy
Defective condenser fan motor.	Replace condenser fan motor (para 3-36).

### 3-14. Reduced Cooling Capacity

Probable cause	Possible remedy
Dirty or clogged air filters	Clean or replace air filters (para 3-25 and 3-26).
Improperly adjusted (closed) evaporator return and discharge air grilles or fresh air and CBR air intakes.	Adjust louvers and dampers correctly (table 2-1).
Dirty or clogged evaporator coil.	Clean evaporator coil (para 3-31).
Improperly set temperature control (too high).	Set temperature control to desired ambient temperature.
Damaged or loose evaporator fans.	Check evaporator fans for damage or looseness. Replace if defective. (para 3-35).
Defective fan motor	Replace evaporator fan motor (para 3-35).
Defective temperature control.	Test temperature control (para 3-41). Replace if defective.

### 3-15. Blower Motor Fails to Start or Stops on Overload

Probable cause	Possible remedy
Defective selector switch	Test selector switch (para 3-41). Replace if defective.
Defective fan motor relay	Test relay (para 3-45). Replace if defective.
Defective fan motor protective relay.	Test relay (para 3-37). Replace if defective.
Open or shorted control circuits.	Perform continuity tests (para 3-40). Repair or replace defective component.
Defective fan motor	Test motor (para 3-37). Repair or replace if defective.
Defective control circuit transformer.	Test transformer (para 3-47). Replace if defective.
Defective control circuit	Test rectifier (para 3-38).

### 3-16. No Heat or Reduced Heat

Probable cause	Possible remedy
Power line failure	Restore power.
Restricted air flow over heaters.	Clean air filters (para 3-31). Clean or replace air filters (para 3-25 and 3-26).
Loose connections or defective wiring in heater or fan circuits.	Tighten connections. Replace defective wiring.
Inoperative evaporator fan motor.	Replace motor.
Defective selector switch	Test selector switch (para 3-41). Replace if defective.
Defective temperature control.	Test temperature control (para 3-41). Replace if defective.
Defective heater thermostat switch.	Test heater thermostat switch. Replace if defective.
Defective or damaged heater elements.	Test heater elements. Replace if defective.
Defective heater relay	Test heater relay. Replace if defective.
Open or shorted control circuits.	Perform continuity tests (para 3-40). Repair or replace defective component.
Defective control circuit transformer.	Test transformer (para 3-47). Replace if defective.
Defective control circuit rectifier.	Test rectifier (para 3-38). Replace if defective.
Defective RFI filters capacitors.	Test RFI filters (para 3-22). Replace if defective.

### 3-17. Inoperative Compressor Heater

Probable cause	Possible remedy
Air conditioner disconnected from power line to stop unit.	Stop unit. Reconnect power line.
Loose electrical connections	Tighten connections.

### 3-19. General Methods Used to Attain Proper Suppression

a. Essentially, suppression is attained by providing a low resistance path to ground for stray currents. Methods used include shielding the ignition and high frequency wires, grounding the frame with bonding straps, and using capacitors and resistors.

b. In the air conditioner, filters are used to ground RFI—producing stray currents in the electrical system. All magnetic contactors and switches are effectively shielded in metal boxes. The control panel, air conditioner casing, and junction box are bonded to each other with electrical leads. The air conditioner is grounded through the junction box to the power line ground wire.

### 3-20. Interference Suppression Components

a. *Primary Suppression Components.* The primary suppression components are those whose primary function is to suppress radio frequency

interference. These components are located in figure 3-3.

b. *Secondary Suppression Components.* These components have radio frequency suppression functions which are secondary or secondary to their primary function.

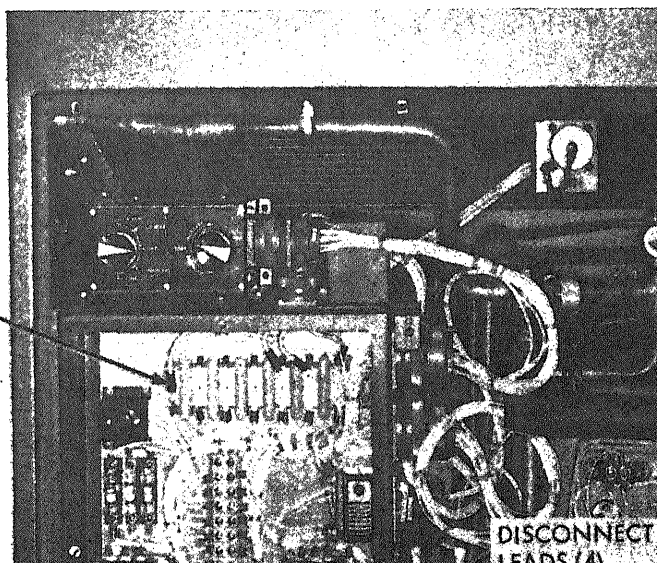
### 3-21. Replacement of Suppression Components

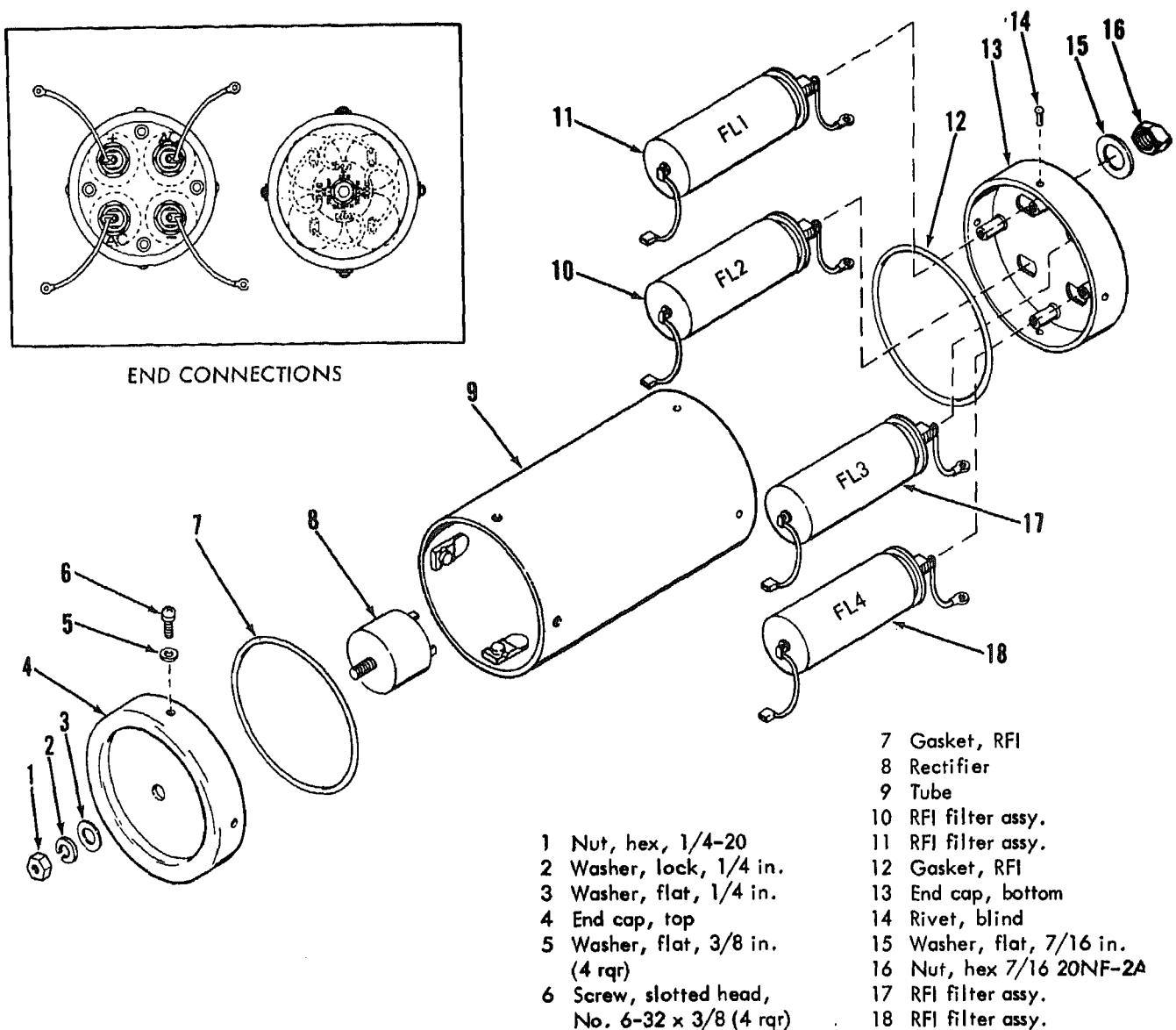
Refer to figure 3-3 and replace defective interference suppression components. For individual filters, refer to figure 3-4. For the complete filter and rectifier assembly, refer to figure 3-5.

### 3-22. Testing of Radio Interference Suppression Components

a. *RFI Filters.* Test the filter with a continuity tester or multimeter on the low range. Replace defective filters. If test is not available and interference is not eliminated, use the trial-and-error method. Test each filter in turn until the cause of the interference is located and eliminated.

POWER WIRING HARNESS  
GROUND CONNECTION





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Figure 3-4. Filter and rectifier assembly, exploded view.

*b. Rectifier.*

(1) Using a multimeter on DC VOLTS range measure rectifier output voltage across positive and negative terminals when 28V AC is applied to the AC terminals through a step-down transformer. Rectifier output should measure  $24 \pm 5V$  DC. Replace rectifier if output voltage is less than specified.

(2) Using a multimeter on OHMS range measure rectifier resistance between terminals 1-2, 2-4, 4-3, and 3-1.

(3) Repeat above procedure, reversing leads to measure resistance between terminals 2-1, 4-2, 3-4 and 1-3.

(4) Compare reading against following chart. Replace rectifier if readings are substantially higher or lower than specified.

Terminal pair	Resistance reading
1-2	1000 ohms or higher
2-1	1 ohm or lower
2-4	1 ohm or lower
4-2	1000 ohms or higher
4-3	1 ohm or lower
3-4	1000 ohms or higher

## Section VII. GRILLES, COVERS, SCREENS, PANELS, FILTERS, FAN GUARD, DAMPER DOOR, AND INSTRUCTION PLATES

### 3-23. General

The air conditioner is constructed with removable aluminum panels. The front access panel provides access to the control panel, junction box, compressor and associated components. A discharge grille protects the evaporator coil and controls the discharge of conditioned air. The intake grille protects the air filter and regulates the amount of air returned to the unit. The condenser coil screen protects the condenser coil. A fan guard protects the condenser fan from damage and protects personnel from injury by the fan. A fresh air inlet opening, covered by a filter, permits the entry of outside air; the amount is regulated by a damper door operated by a knob and linkage. The CBR intake cover provides a closure for the CBR filter attachment opening when CBR filter is not in use.

**Warning:** Disconnect air conditioner from power source before performing any maintenance on the components of the unit.

### 3-24. Top Panel Assembly, Discharge Grille, Intake Grille, and Front Access Panel

*a. Removal.* Refer to figure 3-5, and remove the top panel assembly, discharge grille, intake grille and front access panel.

*Note.* If canvas cover (fig. 1-2) is installed, release fasteners and remove cover before removing top panel assembly.

*b. Inspection.* Inspect insulation and gaskets for damage or deterioration. Inspect grilles for bent louvers.

*c. Disassembly.* Refer to figure 3-6 and disassemble panels and grilles as required to replace defective parts. To remove front access panel insulation, straighten clips and remove holding plates.

*d. Repair.* Straighten bent louvers in grilles. Louvers in intake grille must operate freely. Replace damaged rivet nuts and panel fastener screws.

*e. Assembly.* Refer to figure 3-6 and assemble any parts that were removed. Cement gaskets and insulation in place. After installing insulation

holding plates on front panel, bend ends of clips over to hold plates in place.

*f. Installation.* Install the top panel assembly, discharge grille, intake grille, and front access panel in reverse order of removal as illustrated in figure 3-5.

### 3-25. Air Conditioning Filter

*a. General.* The air conditioning filter is located under the evaporator blower assembly. It removes airborne particles of dust and other contaminants from the conditioned area.

*b. Removal.* Refer to paragraph 3-24 and remove air intake grille. Refer to figure 3-7 and remove air conditioning filter.

*c. Servicing.* Refer to figure 3-7 and service air filter.

*d. Installation.* Refer to figure 3-7 and install air filter. Refer to paragraph 3-24 and install air intake grille.

### 3-26. Fresh Air Filter, CBR Cover, Motor Access Cover, Fan Guard, and Condenser Air Inlet Screen

*a. Removal.* Refer to figure 3-8, and remove the fresh air filter, CBR cover, motor access cover, fan guard, and condenser air inlet screen.

*b. Cleaning.* Wash fresh air filter thoroughly in an approved cleaning solvent and dry thoroughly with compressed air. Coat filter with an adhesive by immersion or spraying (section III, appendix B). Drain excess adhesive before installing filter. Clean metal parts with an approved cleaning solvent.

*c. Installation.* Install the fresh air filter, CBR cover, motor access cover, fan guard, and condenser air inlet screen in reverse order of removal as illustrated in figure 3-8. Fresh air filter must be installed in accordance with airflow arrow stamped on filter.

### 3-27. Damper Control

*a. General.* The damper control includes the fresh air damper door and the mechanism for opening and closing the door.

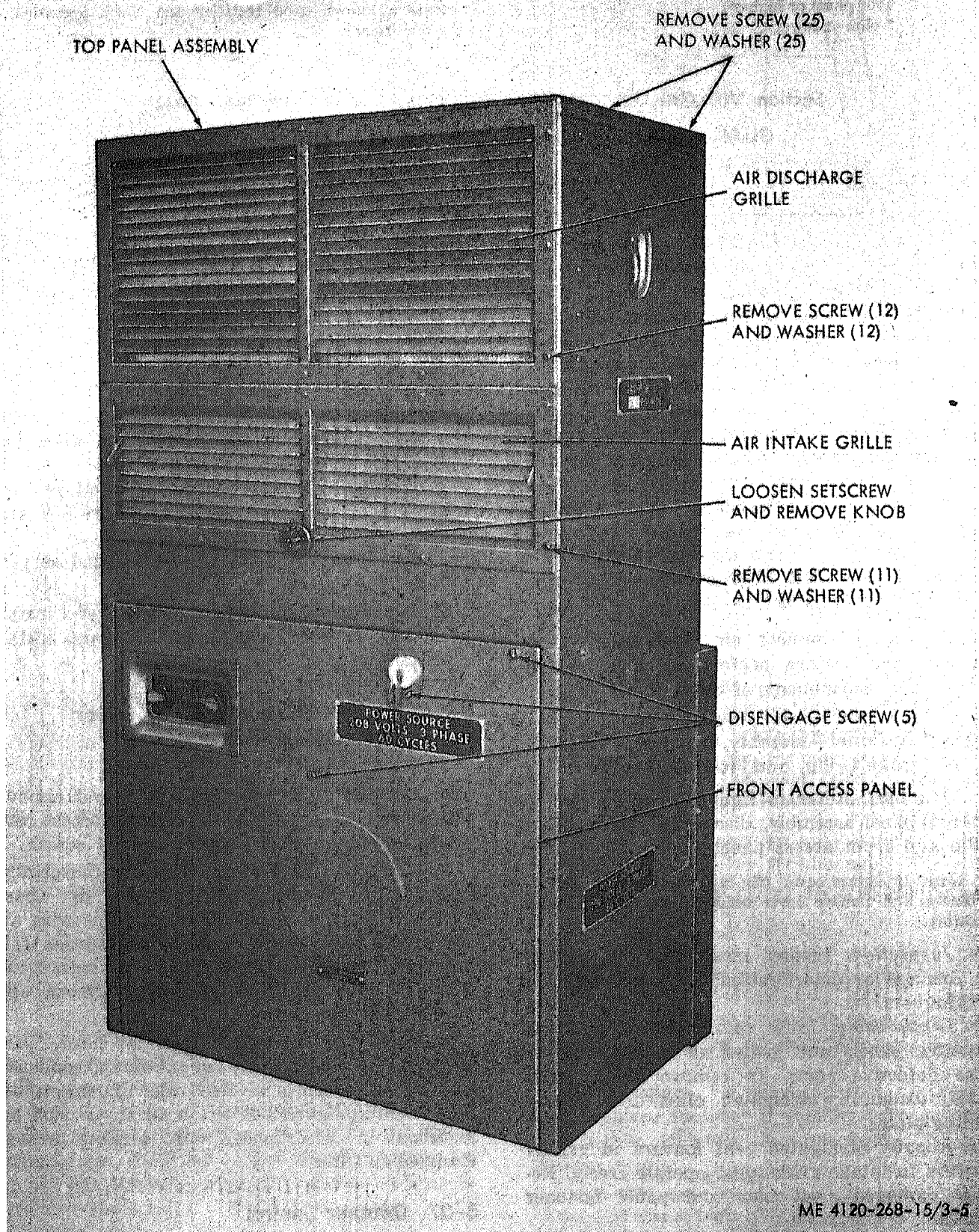


Figure 3-5. Top panel assembly, air intake grille, air discharge grille and front access panel, removal and installation.



*b. Removal.* Refer to figure 3-9 and remove fresh air damper control assembly.

*c. Disassembly.* Refer to figure 3-10 and disassemble damper control in numerical sequence.

*Note.* Knob instruction plates are different for front and back. Mark or tag plates, if removed from knobs, to assure correct location during installation.

*d. Cleaning.* Clean all parts in an approved cleaning solvent and dry with compressed air.

*e. Inspection and Repair.*

(1) Inspect control rod and levers for bent condition. Straighten if possible or replace.

(2) Inspect gears for damaged, worn or broken teeth. Replace defective parts.

(3) Inspect door for warped condition or loose or broken hinges. Tighten or replace hinges as necessary. Replace door assembly if badly warped or otherwise damaged.

(4) Inspect spring washers for flattened or broken condition. Replace defective washers.

*f. Assembly.* Refer to figure 3-10 and reassemble damper control. Do not attach linkage to door until damper control and door have been installed in the air conditioner.

*g. Installation.* Refer to figure 3-9 and install the fresh air damper control assembly by reversing the removal procedures.

*h. Adjustment.*

(1) Loosen screws and nuts, securing housing to partition. Move housing to location where door can be tightly closed by operating the control. Tighten screws.

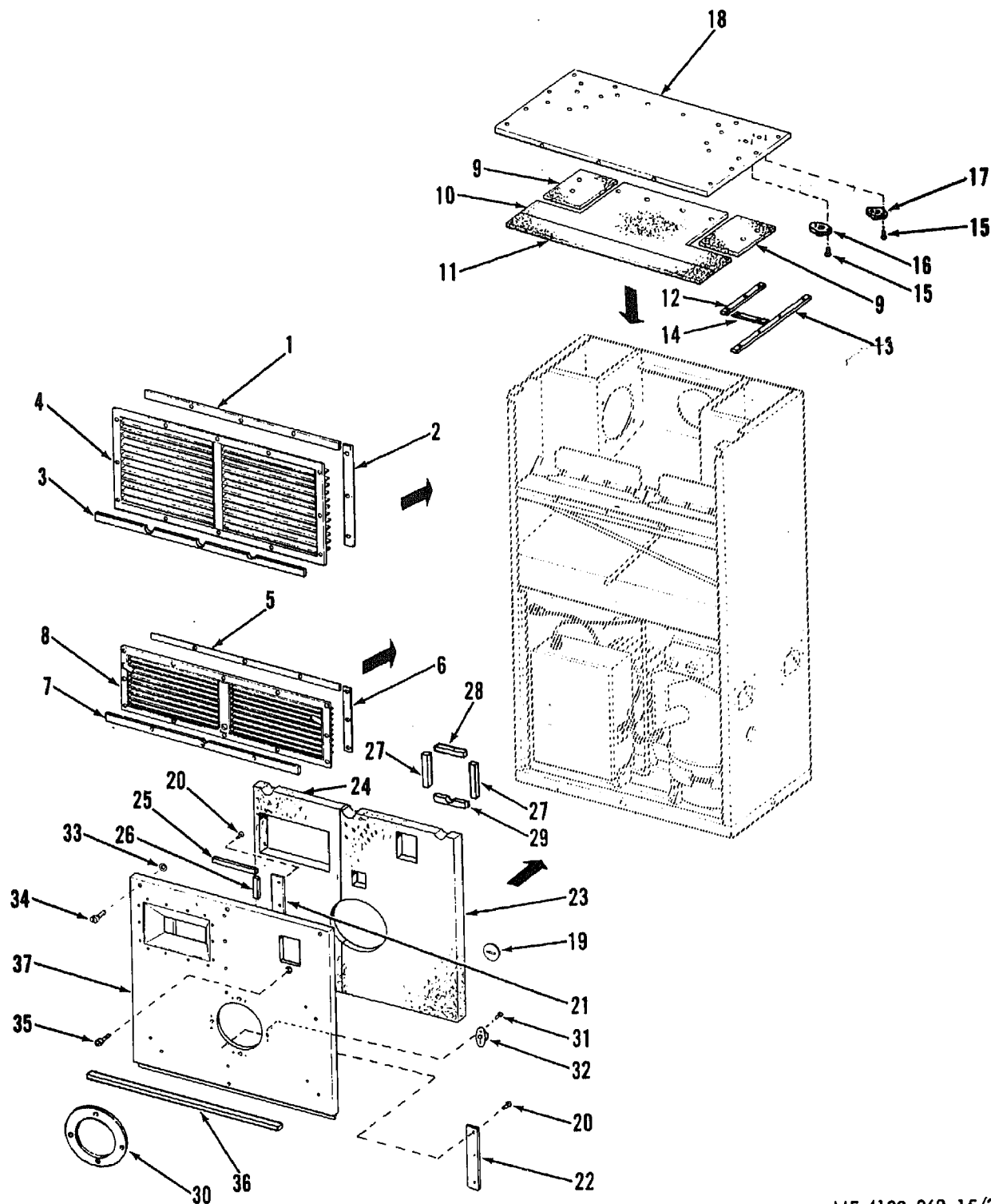
(2) Tighten self-locking nut on long screw that passes through worm gear and lever assembly until spring washers begin to compress and place drag on linkage. Drag must be sufficient to hold door in any position.

### **3-28. Instruction Plates**

*a. General.* Instruction plates provide information for operation of the air conditioner.

*b. Removal.* Carefully file rivets attaching instruction plates to casing and remove plates.

*c. Installation.* Set new rivets to attach new plate securely. Use care to avoid damaging external panels.



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- 1 Gasket
- 2 Gasket (2 rqr)

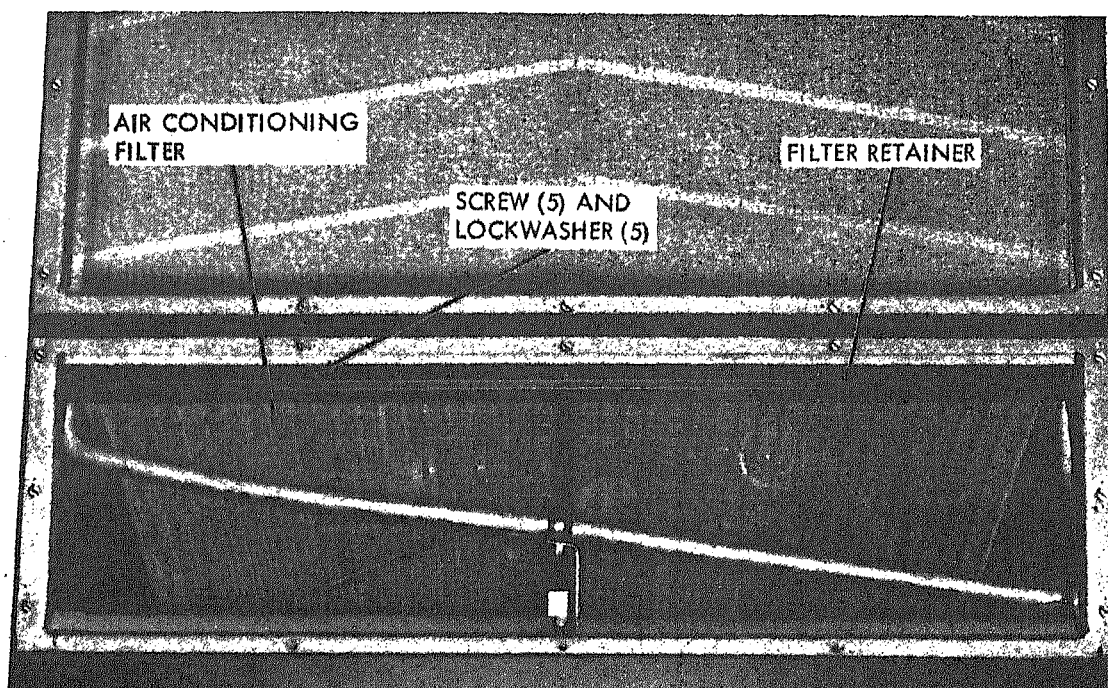
- 3 Gasket
- 4 Grille

- 5 Gasket
- 6 Gasket (2 rqr)

Figure 3-6. Air intake and discharge grilles, top panel assembly, and front access panel, exploded view.

7 Gasket	18 Panel, top	29 Gasket
8 Grille	19 Plate, holding	30 Gasket
9 Insulation (2 rqr)	20 Rivet, blind, 1/4 in. (7 rqr)	31 Rivet, 1/8 x 5/16 in.
10 Insulation	21 Strip	32 Receptacle
11 Insulation	22 Strip	33 Washer, retaining (5 rqr)
12 Gasket (2 rqr)	23 Insulation	34 Screw, panel fastener (3 rqr)
13 Gasket (2 rqr)	24 Insulation	35 Screw, panel fastener (2 rqr)
14 Gasket (2 rqr)	25 Gasket (2 rqr)	36 Gasket
15 Rivet, 3/32 x 1/4 in. (22 rqr)	26 Gasket (2 rqr)	37 Panel, front
16 Nut, plate, No. 10-32 (2 rqr)	27 Gasket (2 rqr)	
17 Nut, plate, No. 8-32 (9 rqr)	28 Gasket	

Figure 3-6—Continued.

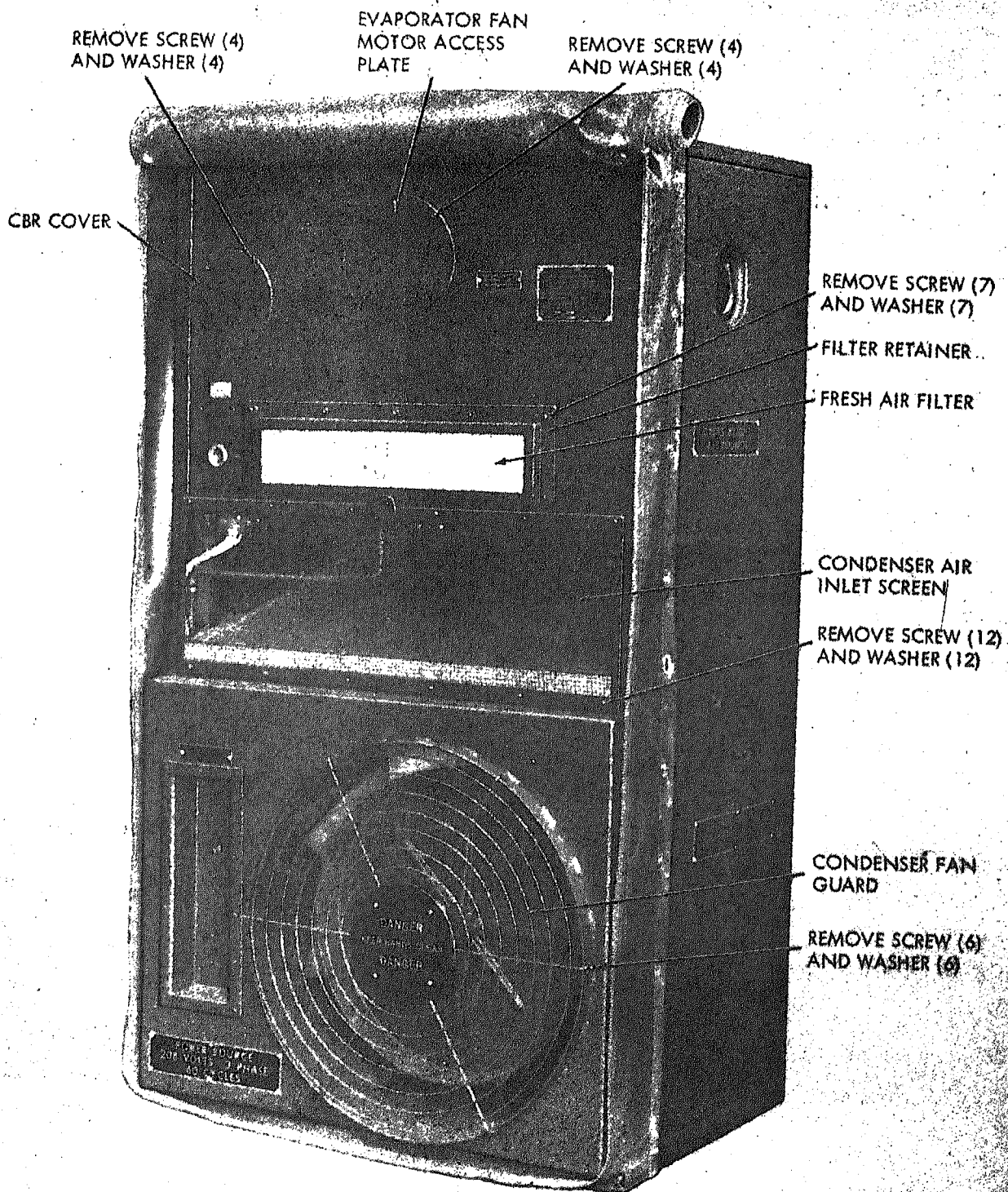


- STEP 1. REMOVE SCREWS (5), LOCK WASHERS (5), AND FILTER RETAINER.
- STEP 2. REMOVE AIR CONDITIONING FILTER.
- STEP 3. WASH FILTER IN APPROVED CLEANING SOLVENT AND DRY THOROUGHLY WITH COMPRESSED AIR. INSPECT FOR SERVICEABILITY.
- STEP 4. COAT FILTER WITH AN ADHESIVE BY IMMERSION OR SPRAYING (REFER TO SECTION III APPENDIX B), DRAIN EXCESS ADHESIVE BEFORE INSTALLING FILTER.

NOTE: FILTER MUST BE INSTALLED IN ACCORDANCE WITH STAMPED AIR FLOW ARROW.

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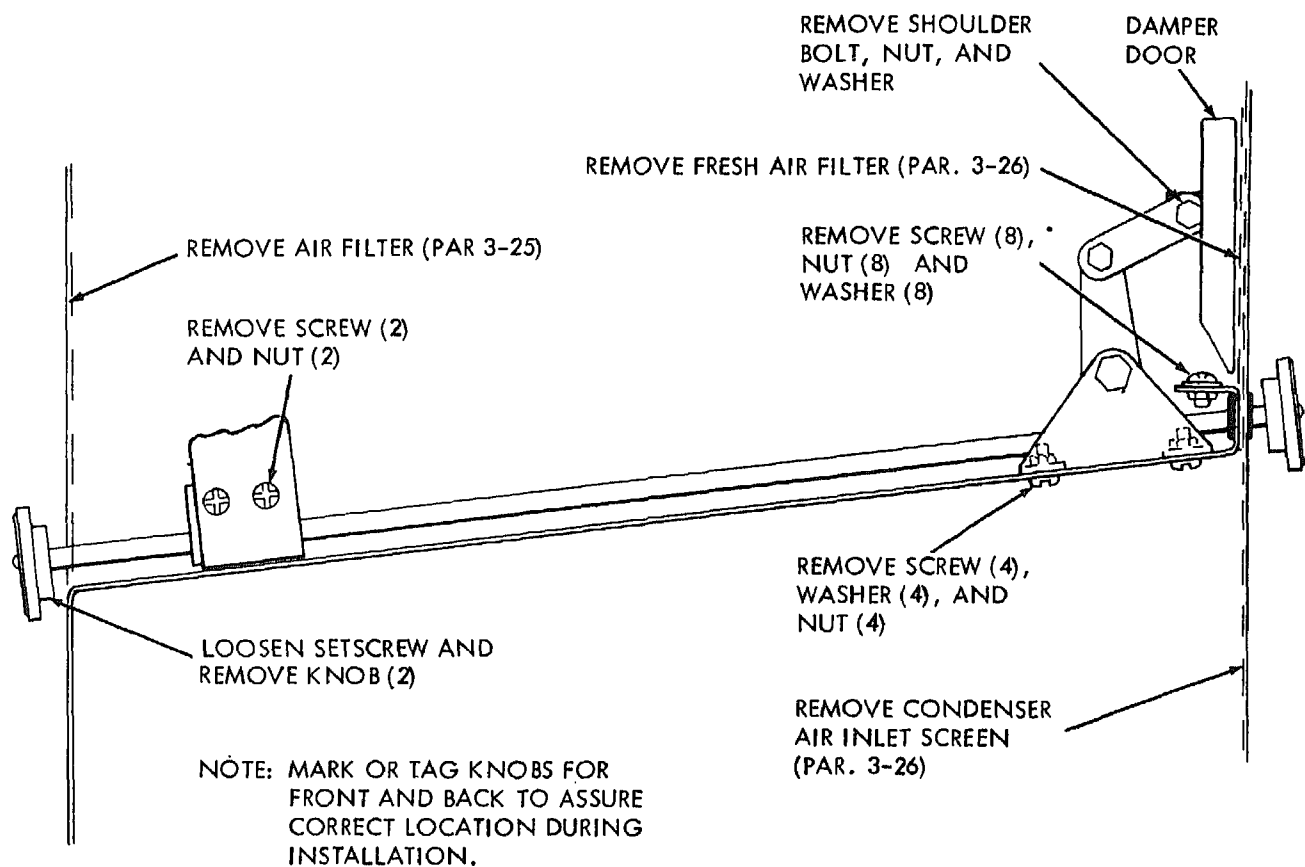
Figure 3-7. Servicing air conditioning filter.



NOTE: REPLACE DEFECTIVE INSULATION ON CBR COVER AND MOTOR ACCESS PLATE. REPLACE DEFECTIVE FRESH AIR FILTER.

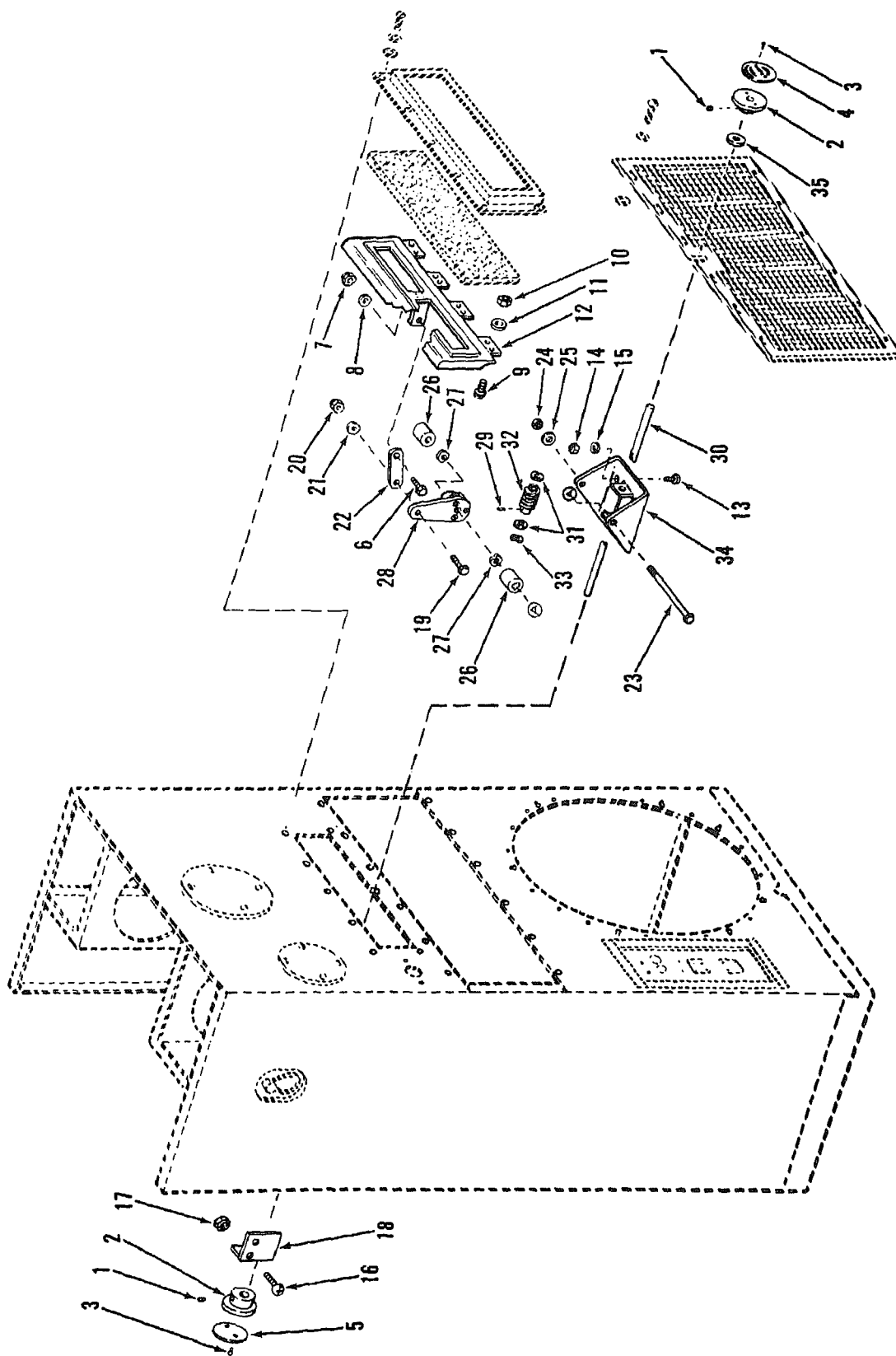
ME 4120-268-15/3-8

Figure 3-8. Fresh air filter, CBR cover, motor access cover, fan guard, and condenser air inlet screen, removal and installation.



ME 4120-268-15/3-9

*Figure 3-9. Fresh air damper control, removal and installation.*



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Figure 3-10. Damper control, exploded view.

1	Setscrew, cup point, No. 10-32 x 3/8 in. (2 rqr)	12	Damper door	23	Screw, cap, hex head, 1/4-28 x 3 in.
2	Knob (2 rqr)	13	Screw, machine, No. 10-32 x 5/8 in. (4 rqr)	24	Nut, self-locking, hex, 1/4-28
3	Screw, drive, No. 2 x 3/16 in. (4 rqr)	14	Nut, self-locking, hex, No. 10-32 (4 rqr)	25	Washer, flat, 1/4 in.
4	Plate, instruction	15	Washer, flat, No. 10 (4 rqr)	26	Spacer
5	Plate, instruction	16	Screw, machine pan head, No. 10-32 x 5/8 in. (2 rqr)	27	Washer, spring (2 rqr)
6	Bolt, shoulder, 1/4-28 x .713 in.	17	Nut, self-locking, hex, No. 10-32 (2 rqr)	28	Worm gear assembly
7	Nut, self-locking, 1/4-28	18	Angle bracket	29	Pin, spring, 3/32 x 11/16 in.
8	Washer, flat, 1/4 in.	19	Bolt, shoulder, 1/4-28 x .838 in.	30	Control rod
9	Screw, machine, pan head, No. 8-32 x 5/8 in. (8 rqr)	20	Nut, self-locking, hex, 1/4-28	31	Washer, flat, 5/16 in. (2 rqr)
10	Nut, self-locking, hex, No. 8-32 (8 rqr)	21	Washer, flat, 1/4 in.	32	Worm
11	Washer, flat, No. 8 (8 rqr)	22	Linkage arm	33	Washer, spring
				34	Housing
				35	Grommet

Figure 3-10—Continued.

### 3-29. General

The mist eliminator, located between the air discharge grille and the evaporator coil, removes moisture from the air after the air has passed over the evaporator coil. A drip pan located below the mist eliminator and evaporator coil, is provided to catch condensate. Drain tubes attached to the drip pan are connected to a removable gooseneck type drain tube located in the lower part of the air conditioner. The drain tube consists of a gooseneck tube and spring loaded check valve. The check valve prevents air from entering the evaporator compartment when the drain tube is dry.

### 3-30. Mist Eliminator

*a. Removal.* Refer to paragraph 3-24 and remove the evaporator air discharge grille and top panel assembly. Refer to figure 3-11 and remove mist eliminator.

*b. Servicing.* Refer to figure 3-11 and clean the mist eliminator.

*c. Installation.* Refer to figure 3-11 and install the mist eliminator. Install evaporator discharge grille and top panel assembly (para 3-24).

### 3-31. Evaporator Coil Service

*a. General.* The evaporator coil should be cleaned each time the mist eliminator is serviced.

The coil may be cleaned without removal from air conditioner.

*b. Maintenance Procedure.* Refer to figure 3-11 and perform prescribed maintenance service

### 3-32. Drip Pan and Drain Tube

*a. General.* The mist eliminator drip pan will be cleaned when the mist eliminator is serviced. Refer to figure 3-11. Maintenance of the gooseneck drain tube, check valve and hose is covered in this paragraph.

*b. Removal and Disassembly.* Refer to figure 3-12 and remove and disassemble the gooseneck drain tube.

*c. Cleaning, Inspection, and Repair.* Clean all parts thoroughly. Inspect hose for cracks or deterioration. Inspect tube for cracks or damaged valve seat. Inspect spring for weak or broken condition. Replace defective parts.

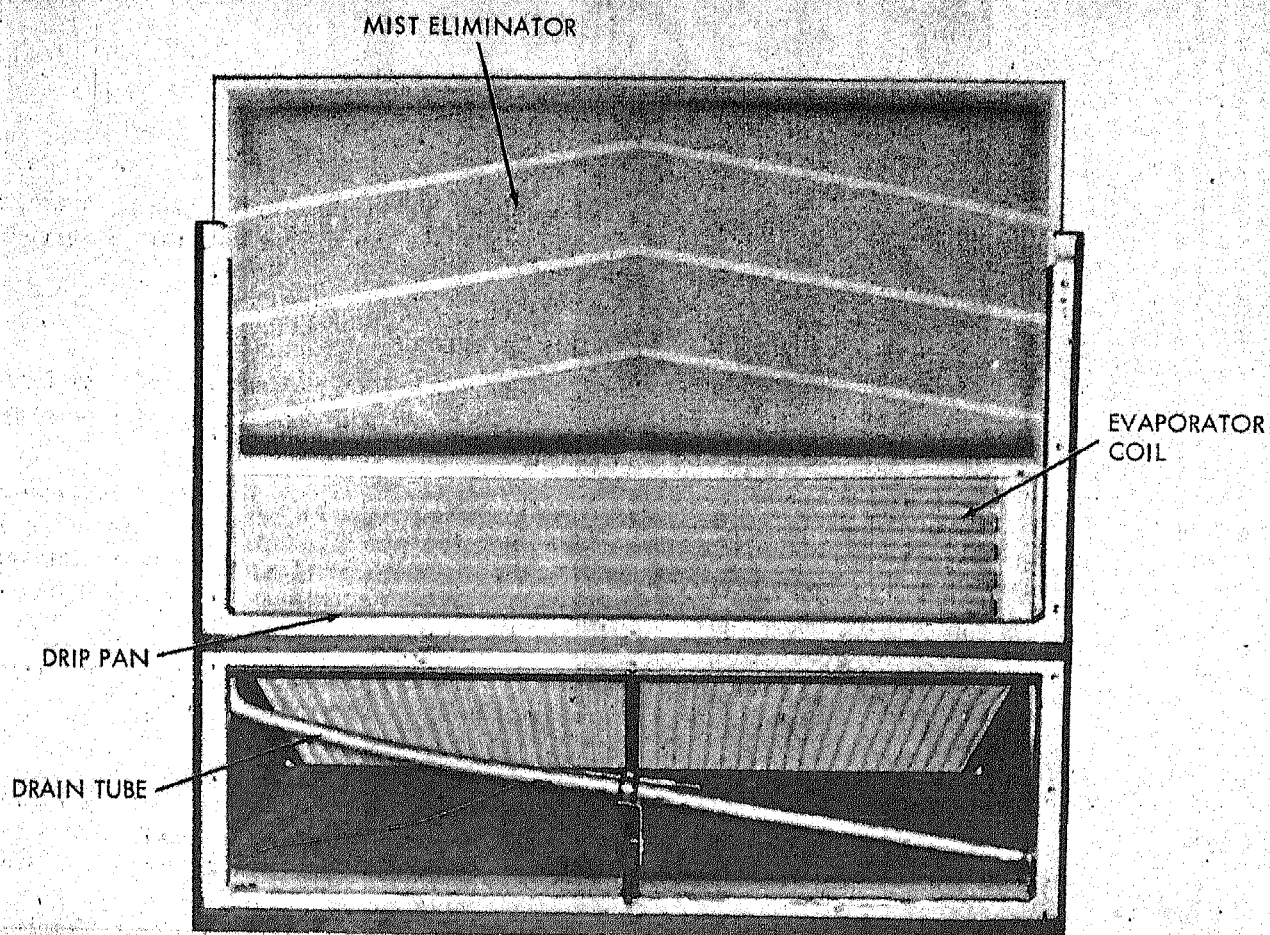
*d. Reassembly and Installation.* Reassemble and install drain tube (fig. 3-12).

### 3-33. Condenser Coil Service

*a. General.* The condenser coil may be cleaned without removal from the air conditioner. Clean screen, guard, and condenser fan blade when cleaning condenser coil.

*b. Maintenance Procedure.* Refer to figure 3-13 and perform prescribed maintenance service.





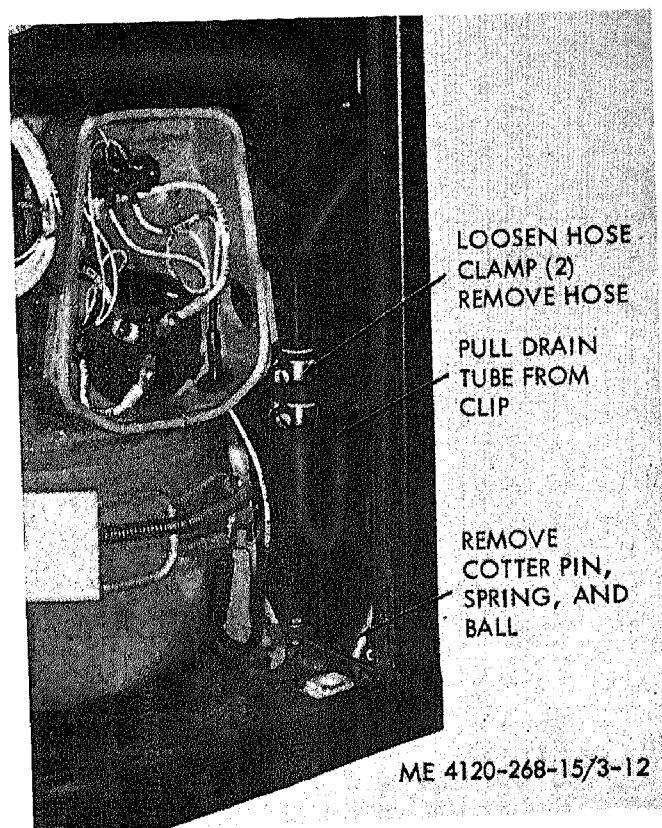
- STEP 1. SLIDE MIST ELIMINATOR UPWARD OUT OF GUIDES.  
 STEP 2. WASH MIST ELIMINATOR IN AN APPROVED CLEANING SOLVENT AND DRY THOROUGHLY WITH COMPRESSED AIR.  
 STEP 3. CLEAN OUT DRIP PAN AND DRAIN TUBES.  
 STEP 4. CLEAN EVAPORATOR COIL SURFACE. BLOW DUST AND OTHER FOREIGN MATTER FROM BETWEEN FINS WITH COMPRESSED AIR. HOLD NOZZLE OF AIR HOSE AT LEAST 6 TO 8 INCHES FROM COIL TO AVOID DAMAGE TO FINS.

WARNING: DO NOT USE STEAM TO CLEAN COIL.

NOTE: THE MIST ELIMINATOR MUST BE INSTALLED IN ACCORDANCE WITH STAMPED WORD "TOP" AND AIRFLOW ARROW.

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Figure 3-11. Servicing mist eliminator and evaporator coil.



*Figure 3-12. Drain tube, removal, disassembly, reassembly and installation.*

**WARNING:** DISCONNECT AIR  
CONDITIONER FROM  
POWER LINE BEFORE  
PERFORMING ANY  
MAINTENANCE.

REMOVE SCREW (12) AND  
FLAT WASHER (12)

CONDENSER COIL

REMOVE CONDENSER AIR  
INTAKE SCREEN. WASH  
SCREEN IN AN APPROVED  
CLEANING SOLVENT

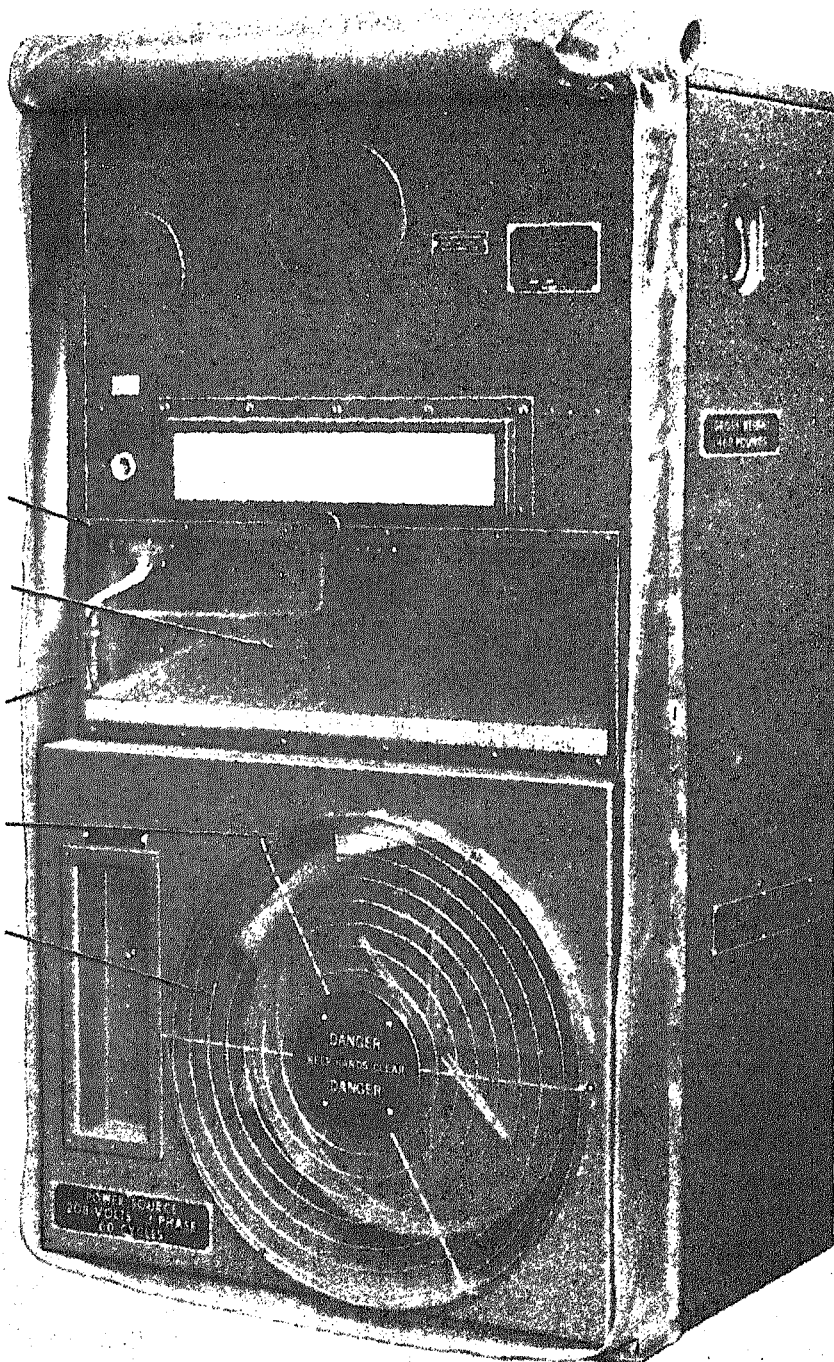
REMOVE SCREW (6) AND  
NUT (6)

REMOVE GUARD

CLEAN GUARD AND FAN WITH  
AN APPROVED CLEANING  
SOLVENT

**WARNING:** DO NOT USE  
STEAM TO  
CLEAN COIL.

CLEAN COIL SURFACE. BLOW DUST AND OTHER FOREIGN MATTER  
FROM BETWEEN FINS WITH COMPRESSED AIR. HOLD NOZZLE OF  
AIR HOSE AT LEAST 6 TO 8 INCHES FROM COIL TO AVOID DAMAGE  
TO FINS.



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*Figure 3-13. Servicing condenser coil, fan, and screen.*

### 3-34. General

The MAC4V40-340-3 and MAC6V40-340-2 air conditioners are equipped with centrifugal air foil evaporator fans. The double end shaft motor is mounted on a bracket at the top of the air conditioner behind the evaporator coil and heaters. The vaneaxial condenser fan is mounted on the motor shaft. The fan motor support, baffle, and venturi ring are mounted on the lower back panel.

### 3-35. Evaporator Fan and Motor Assembly

#### a. Removal.

*Note.* The motor may be tested (para 3-37) without removing the motor from the air conditioner.

(1) Refer to paragraph 3-24 and remove top panel assembly.

(2) Refer to paragraph 3-26 and remove fan motor access plate.

(3) Refer to figure 3-14 and remove inlet rings and fan and motor assembly.

b. *Disassembly.* Refer to figure 3-14 and remove fans and keys from motor.

c. *Motor Test.* Refer to paragraph 3-37 for motor tests and repairs.

d. *Assembly.* Refer to figure 3-14 and assemble fan and motor assembly in reverse order of disassembly.

#### e. Installation.

(1) Refer to figure 3-14 and install evaporator fan and motor assembly.

(2) Install motor access plate (para 3-26).

(3) Install top panel assembly (para 3-24).

### 3-36. Condenser Fan and Motor

#### a. Removal.

(1) Remove fan guard (para 3-26).

(2) Refer to figure 3-15, and remove the condenser fan.

*Note.* The motor may be tested (para 3-37) without removing the motor from the air conditioner.

(3) Remove front access panel (para 3-24).

(4) Refer to figure 3-16 and remove condenser fan motor.

b. *Motor Test.* Refer to paragraph 3-37 for motor tests and repairs.

#### c. Installation.

(1) Refer to figure 3-16 and install motor in reverse order of removal.

(2) Install front access panel (para 3-24).

(3) Install the condenser fan in reverse order of removal as illustrated on figure 3-15.

(4) Install fan guard (para 3-26).

### 3-37. Evaporator Fans and Condenser Fan Electric Motors

a. *General.* The evaporator and condenser fan motors are of the squirrel cage, induction type. Both motors operate on three-phase 208V AC and are connected across the line by means of individual relays energized by the control circuit. Motors on the MAC4V40-340-3 air conditioner are designed for 400 cycle service. The MAC4V-60-340-2 motors operate on 50-60 cycles. Both models are similar in appearance and are protected by internal self-resetting thermal overload and overcurrent protectors.

b. *On-Equipment Testing.* Before removing the motor for replacement, test the motor windings for opens and grounds:

(1) Disconnect receptacle connector from motor junction box.

(2) Test continuity across each combination of two motor terminals. Lack of continuity indicates an open winding.

(3) Place one contact of the tester against motor housing and the other against the motor terminals one at a time. If a circuit is indicated, the motor is grounded.

(4) Test the motor stator for insulation resistance as instructed in TM 5-764. The insulation resistance should measure not less than 0.5 megohms for the motor on either model.

*Note.* The resistance measurement should be used only as a general guide, taking into consideration the accuracy of the instrument used, test lead resistance, and ambient temperature at time of test. If more precise measurement is required, an instrument such as a Kelvin or Wheatstone bridge should be used, or comparative measurement between the suspected component and a like item known to be good should be utilized. In all cases where a megohmmeter is used for testing, make certain that the unit is thoroughly dry. Wet condemnation tolerances should be considered.

(5) Connect the air conditioner to a proper source of power. Use a hook-type ammeter and read the amperage flowing in each of the evaporator fan motor leads. On model MAC4V40-340-3 the ammeter should indicate between 3.8 and 2.66 amperes. On model MAC6V40-340-2 the ammeter should indicate between 7.9 and 5.43 amperes at full load for model MAC4V40-340-3. On model MAC6V40-340-2 the ammeter should indicate between 5.97 and 4.18 amperes at full load.



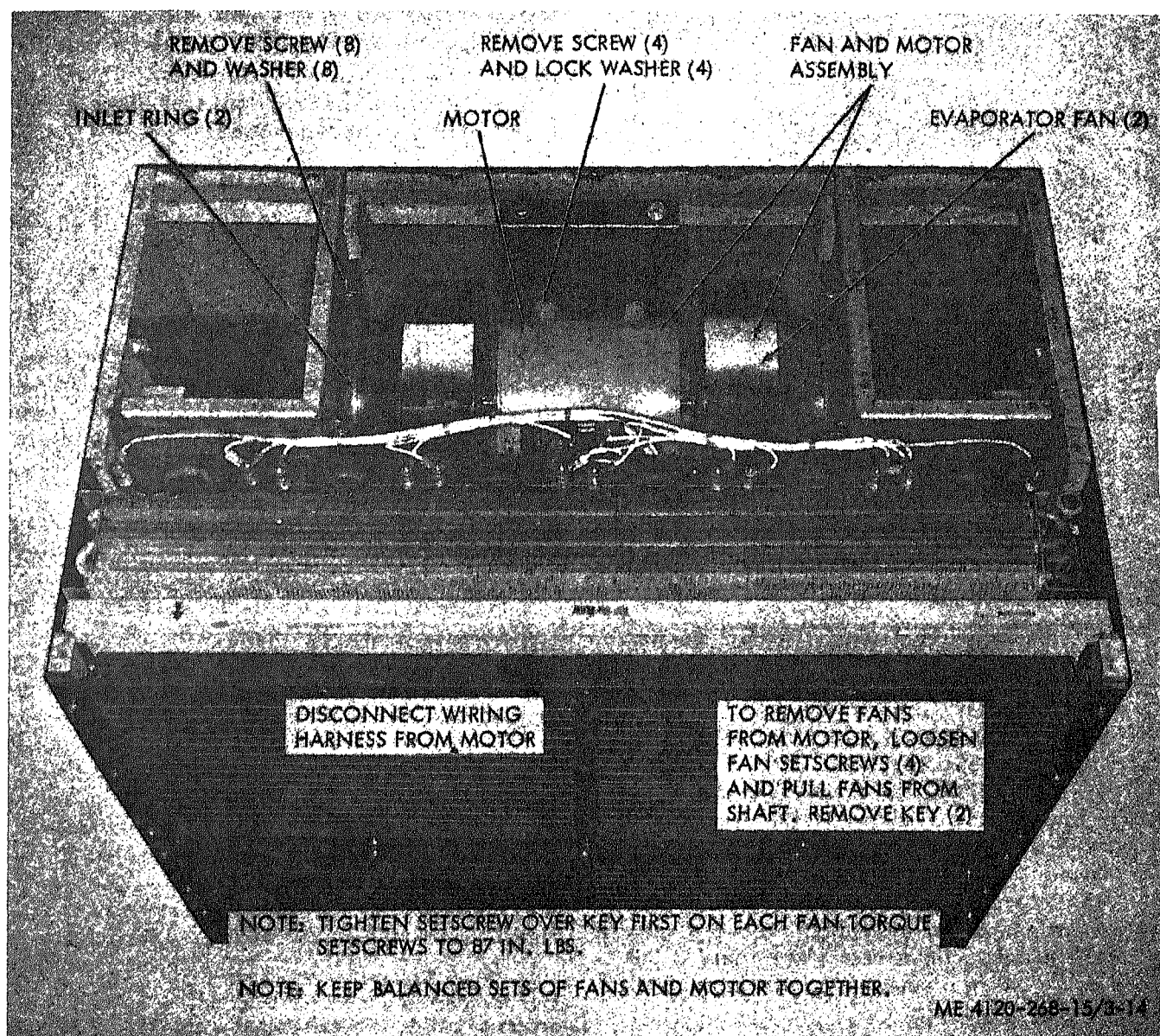


Figure 3-14. Evaporator fan and motor assembly, removal, disassembly, assembly and installation.

c. *Removal.* Refer to paragraphs 3-35 and 3-36 and remove fan motors.

d. *Disassembly.* Refer to figure 3-17 and disassemble the evaporator fan motor. Refer to figure 3-18 and disassemble the condenser fan motor.

e. *Testing of Overload Protector.* Disconnect the electrical leads from the overload protector. Test the protector with a multimeter set on OHMS. If continuity does not exist, replace the overload protector.

f. *Cleaning, Inspection and Repair.*

(1) Clean all metal parts with a cloth dampened in approved cleaning solvent.

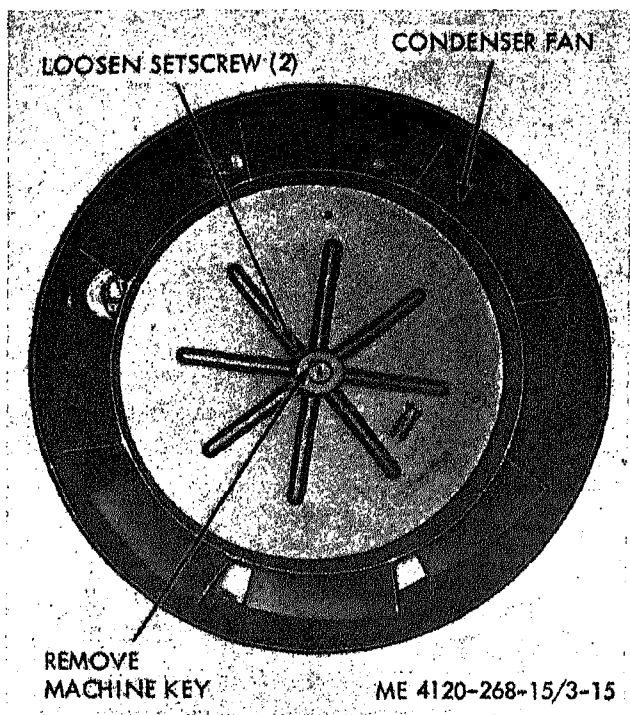
(2) Inspect the stator housing for cracks, breaks, or other defects. Replace a damaged or defective housing.

(3) Inspect bearings for pits, scoring, wear, and out-of-round. Replace worn or defective bearings.

(4) Inspect the rotor shaft for cracks, wear, and misalignment. Replace a damaged or defective rotor.

(5) Inspect rotor for cracks, breaks, and damaged laminations. Replace the rotor and stator if they are damaged.

(6) Inspect all threaded parts for damage. Replace as necessary.



*Figure 3-15. Condenser fan, removal and installation.*

*g. Reassembly.* Refer to figure 3-17 and reassemble the evaporator fan motor. Refer to figure 3-18 and reassemble the condenser fan motor.

*h. Installation.* Refer to paragraphs 3-35 and 3-36 and install the fan motors.

### **3-38. Back Panel and Motor Support**

*a. Removal.* Refer to figure 3-19 and remove back panel and motor support assembly.

*b. Installation.* Refer to figure 3-19 and install back panel by reversing removal procedures.

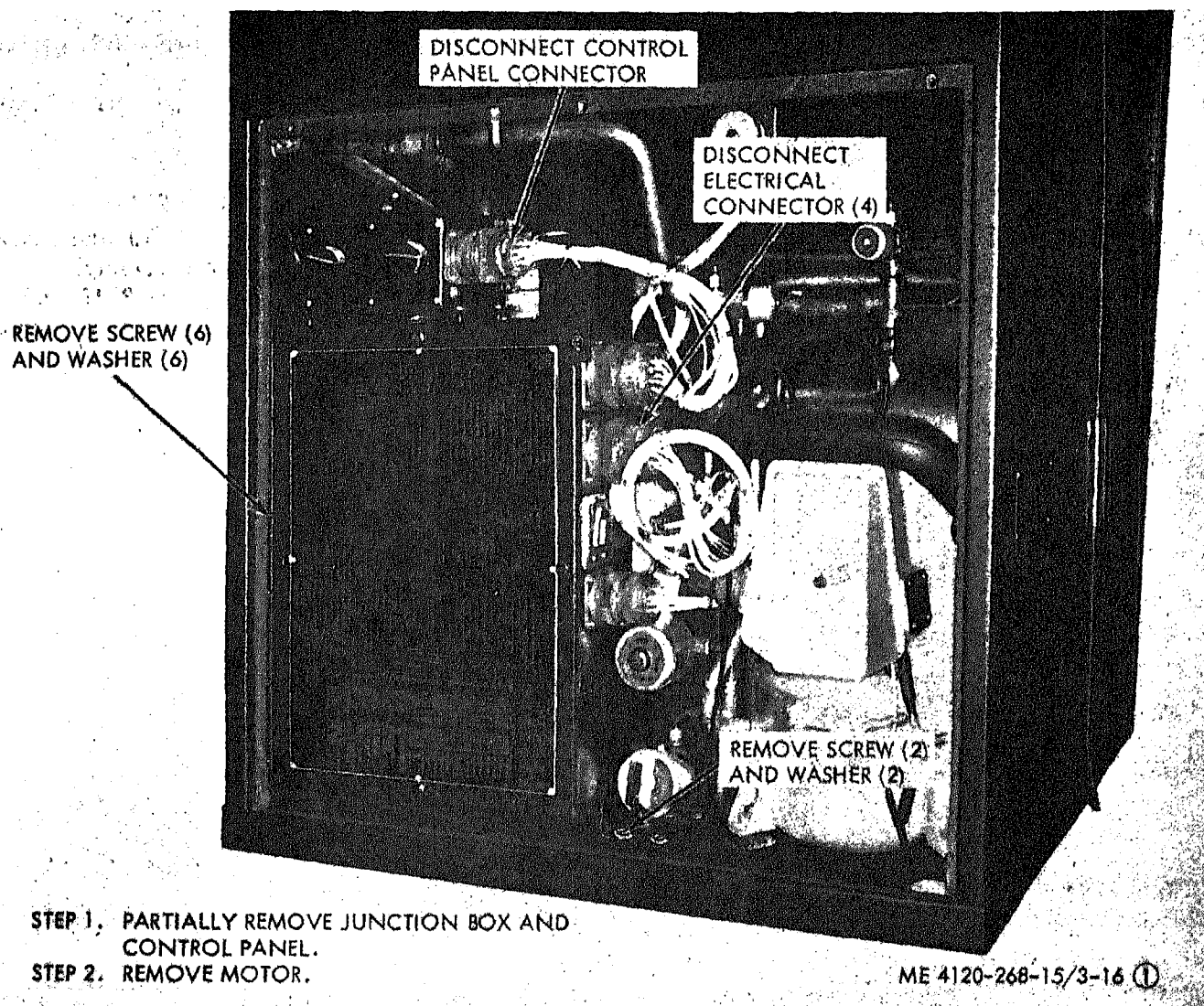
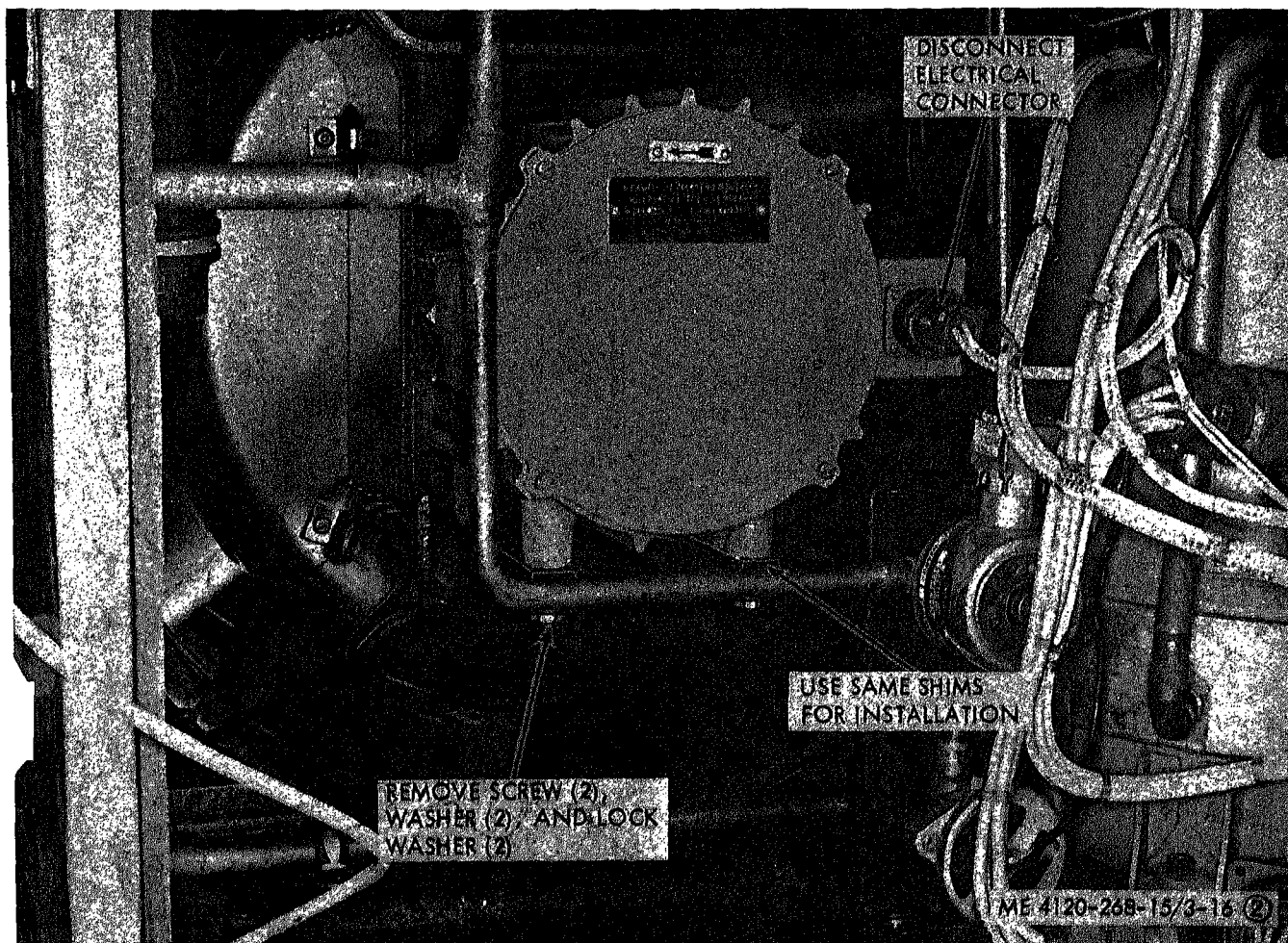


Figure 3-16. Condenser fan motor, removal and installation (Sheet 1 of 2).



*Figure 3-16. Condenser fan motor, removal and installation (Sheet 2 of 2).*



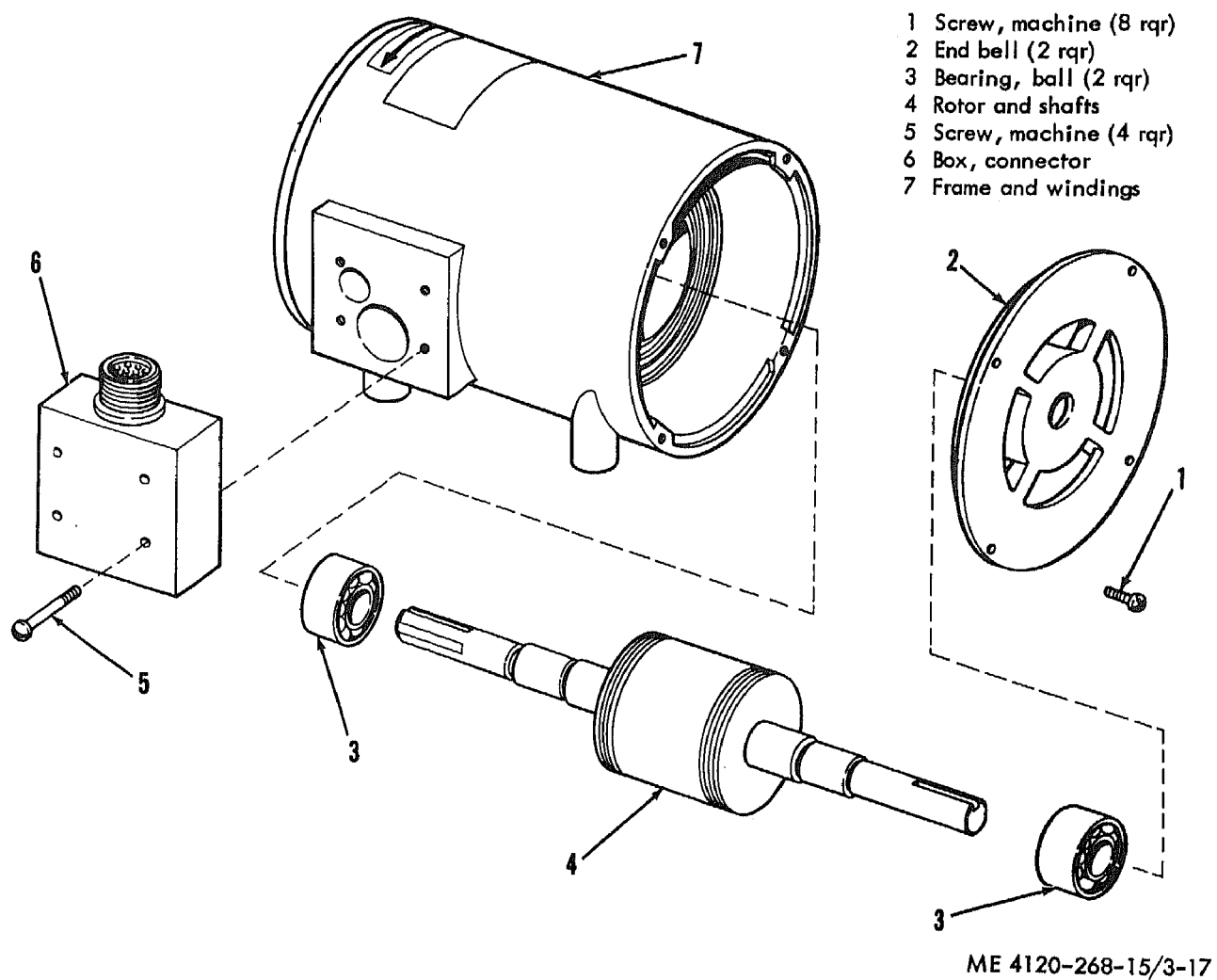


Figure 3-17. Evaporator fan motor, exploded view.

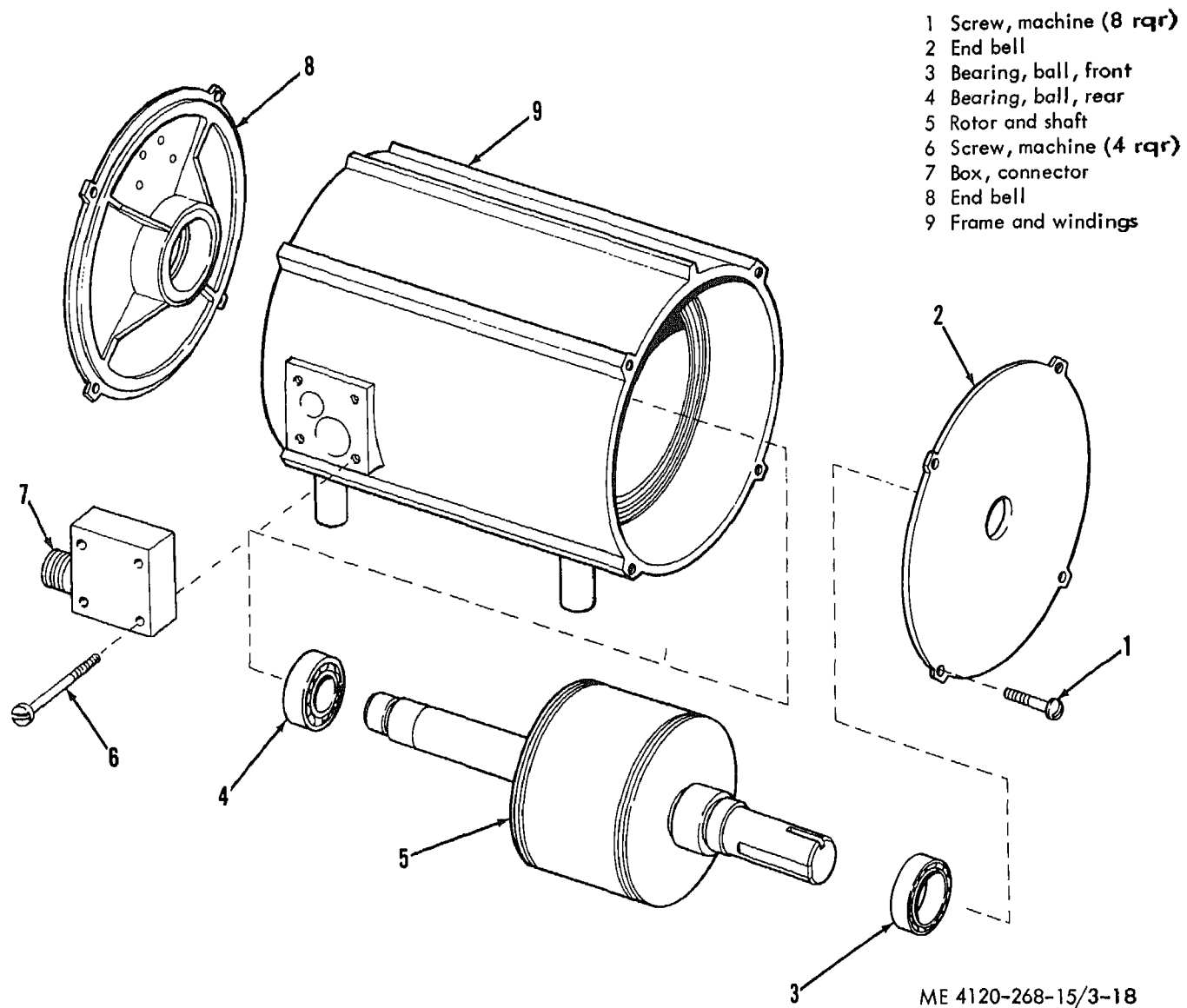
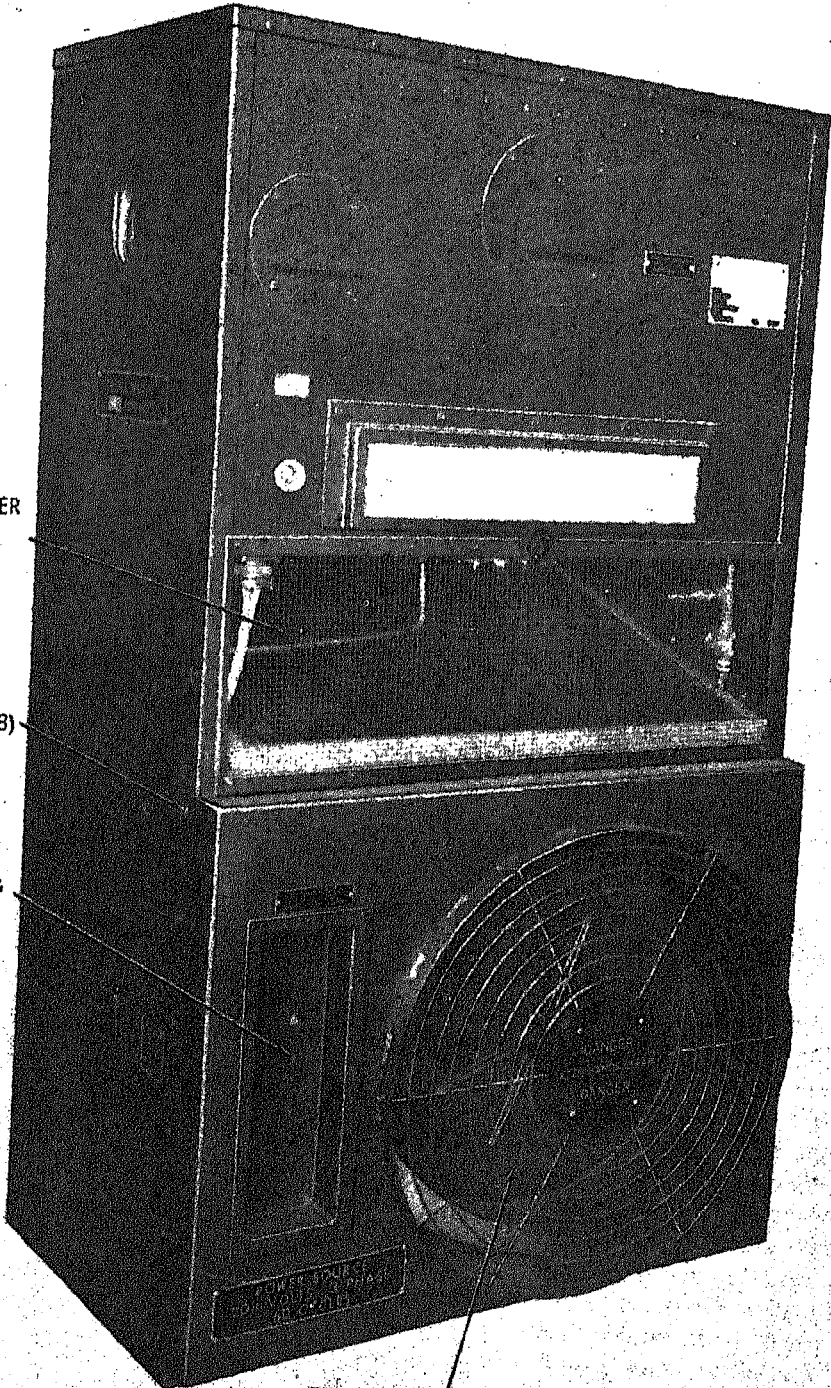


Figure 3-18. Condenser fan motor, exploded view.



REMOVE CONDENSER  
AIR INLET SCREEN  
(PAR. 3-26)

REMOVE SCREWS (18)

REMOVE PRESSURE  
SWITCH MOUNTING  
SCREWS (4)

REMOVE CONDENSER  
FAN GUARD (PAR. 3-26)

REMOVE CONDENSER FAN AND  
MOTOR (PAR. 3-36)

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*Figure 3-19. Back panel and motor support, removal and installation.*

**3-39. General**

The electrical system (fig. 1-4 and 1-5) consists of the compressor, fan motors, relays, solenoid valves, selector switch, temperature control, fuses, circuit breaker, heaters, heater thermostatic switch, high and low pressure cutout switches, transformer, RFI filters, time delay relay and all internal wiring. The fan motors and the compressor are covered in separate sections.

**3-40. Wiring Harnesses and Wire Leads**

*a. General.* The electrical circuits in the air conditioner are completed by individual wire leads or by wire leads laced or enclosed in a loom to form a wiring harness. All of the wiring carries code numbers. When testing, repairing or replacing the wiring harness or individual wires, refer to the wiring diagrams, figure 1-4.

*b. Inspection.* Inspect all wiring installations for cracked or frayed insulation material. Pay particular attention to wires passing through holes in the frame or around sharp edges. Repair or replace defective wiring. Inspect electrical connectors and fittings for damage or broken condition. Replace defective connectors and fittings.

*c. Testing.* Test for continuity in leads or wiring harnesses by disconnecting each end. Where wires terminate in an electrical connector, disconnect connector from corresponding receptacle connector or plug connector. Touch the test probes of a continuity tester or multimeter set on low OHMS range to ends of wire or to corresponding pin of connector. If continuity is not indicated, repair or replace wire.

*d. Repair.* Remove insulation to expose 1/2 inch of bare wire on each side of break. Twist the wire ends together and solder the splice. Cover the splice with rubber or PVC electrical tape and friction tape making certain to cover all the repaired area. Replace broken terminal lugs with exact duplicates. To replace electrical connectors, unsolder wires from solder wells of inserts. Install new connector and insert ends of wires in solder wells. Solder wires in place. Check connections carefully. Refer to figure 1-4 for wiring diagram.

**3-41. Control Panel**

*a. General.* The control panel contains the selector switch and temperature control. The selector switch is a manually operated, five-position rotary switch which is used to turn on the "COOL", "HEAT" and "VENTILATE" modes

and to turn off the air conditioner. The temperature control is a temperature sensing manually set single-pole double-throw switch which automatically controls both heating and cooling cycles to maintain any selected conditioned area temperature between +40°F and +90°F.

*b. Removal.* Refer to figure 3-20 and remove control panel.

*Note.* Use care in removing temperature control thermostat remote bulb and capillary tubing.

*c. Disassembly.* Refer to figure 3-21 and disassemble control panel in numerical sequence.

*d. Testing Selector Switch.* Using a multimeter set on OHMS, refer to figure 3-22 and test for continuity or open circuit as indicated on the chart. Replace the selector switch if it fails to operate as specified.

*e. Testing Temperature Control.*

(1) Rotate shaft so flat faces away from terminals. Using a multimeter set on OHMS, refer to figure 3-23 and test for continuity between each of the control terminals and the common terminal. It will be necessary to rotate the shaft clockwise ("warmer" direction) or counterclockwise ("cooler" direction) to open and close each set of contacts. Replace temperature control thermostat if contacts do not operate as indicated.

(2) The temperature control thermostat should maintain conditioned area temperature within  $2^{\circ} \pm 1^{\circ}\text{F}$  of the temperature selected. Replace temperature control thermostat if operating differential is larger than specified.

*f. Reassembly.* Refer to figure 3-21 and assemble control panel in reverse of numerical sequence. Attach ground lead of wiring harness (22, fig. 3-21) between washers (17) on screw (14).

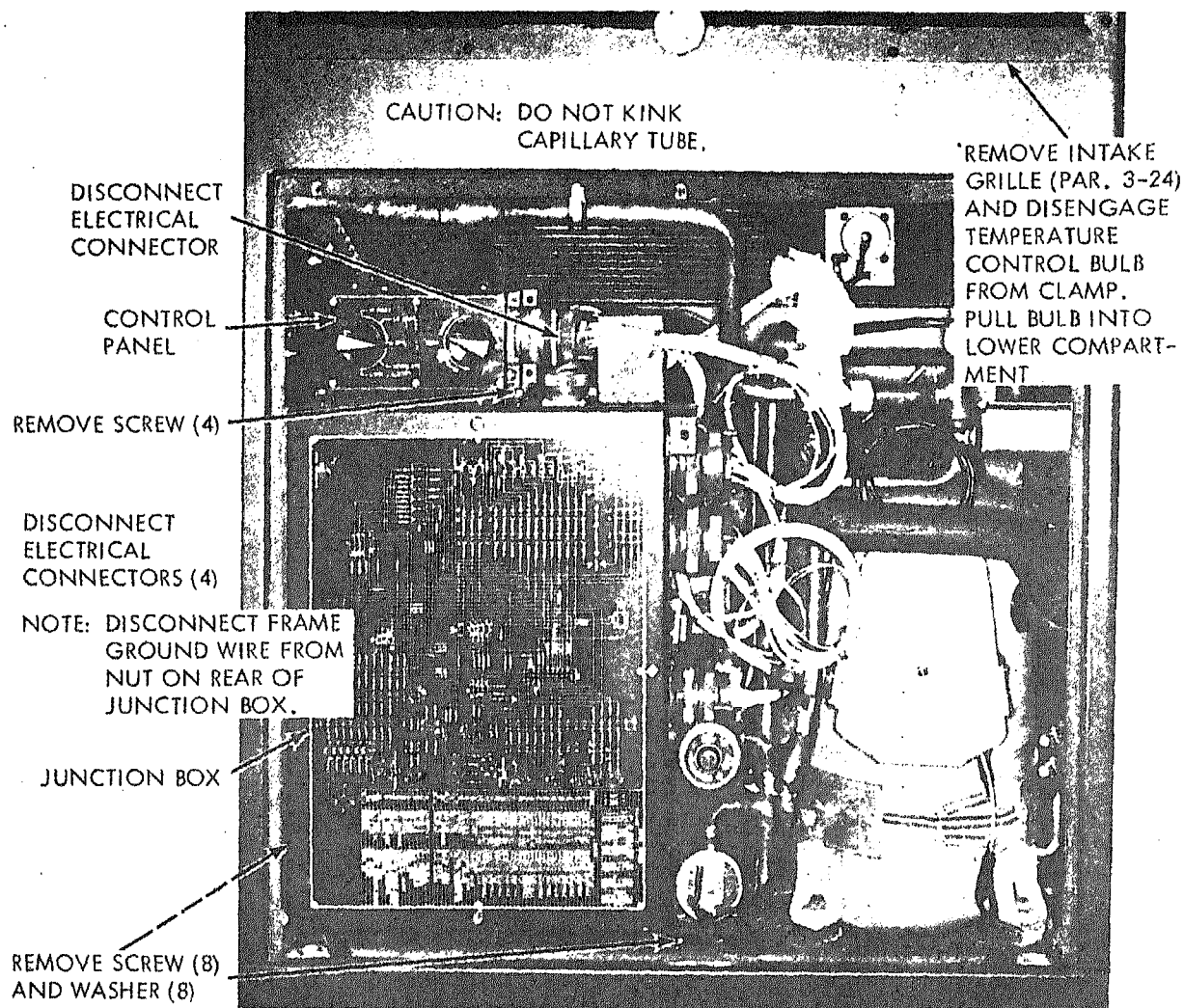
*g. Installation.* Refer to figure 3-20 and install control panel.

**3-42. Junction Box**

*a. General.* The junction box contains heater and motor relays, time delay relay, circuit breaker, fuses, leads, and terminal boards. The transformer is mounted on the top of the box and the RFI filter assembly is mounted on the back of the box.

*b. Removal.* Refer to figure 3-20 and remove junction box.

*c. Testing and Repair.* If troubleshooting procedures or faulty operation of the air conditioner indicate trouble in the junction box, check continuity of circuits, and inspect for loose or incorrect



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*Figure 3-20. Control panel and junction box, removal and installation.*

connections. Visually inspect leads for damage. Correct any deficiencies.

*d. Replacement of Components.* Tests and repair instructions for junction box components are contained in succeeding paragraphs. It is not necessary to remove the junction box assembly to replace individual components but it may be convenient to remove the box and move it to a suitable work bench.

**Warning:** Do not perform any maintenance work on the junction box unless the air conditioner has been disconnected from the power source.

*e. Installation.* Refer to figure 3-20 for installation instructions.

### 3-43. Fuses

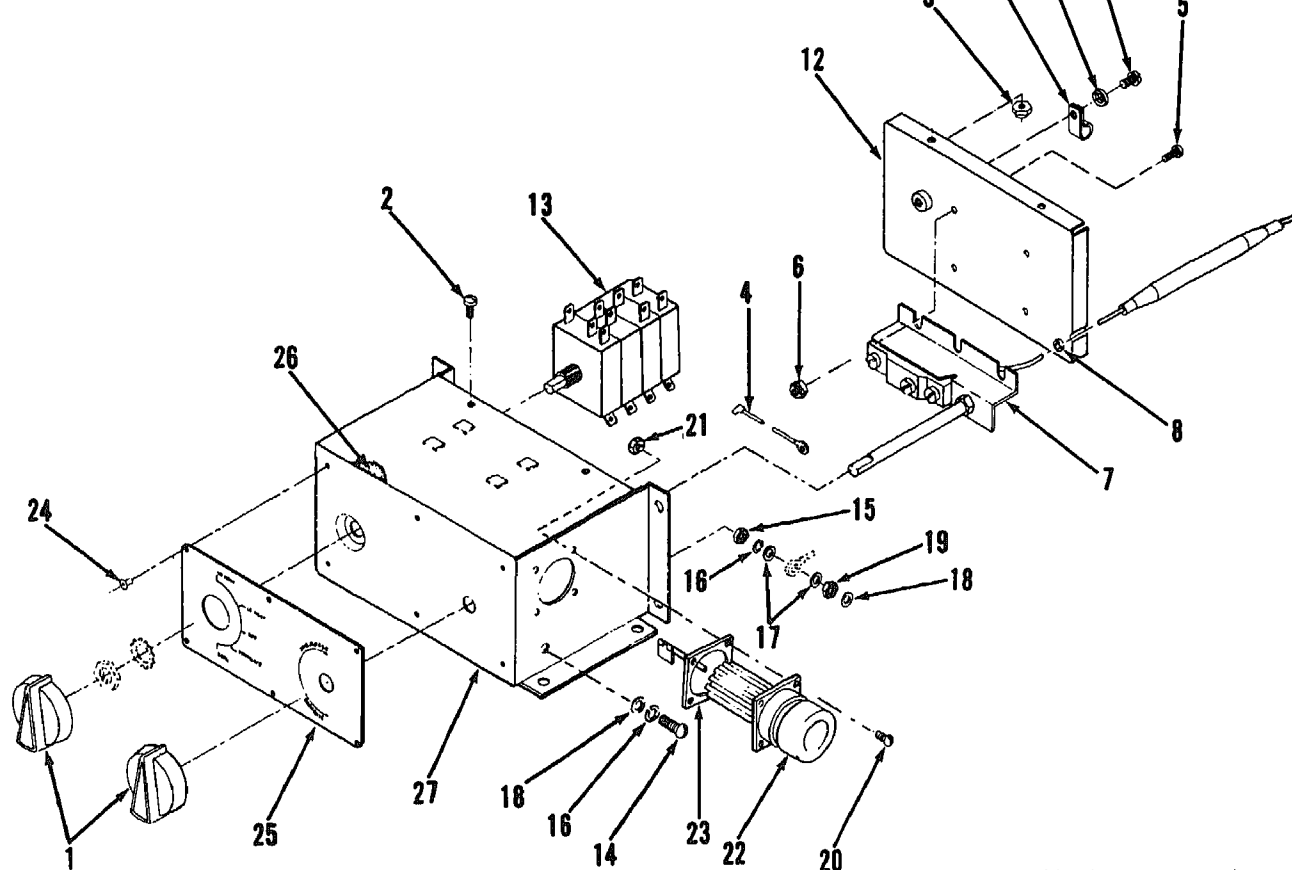
*a. Removal.* Refer to figure 3-24 and remove fuses.

*b. Test.* Test fuses for continuity. If fuse is open, replace fuse.

*c. Installation.* Refer to figure 3-24 and install fuses.

### 3-44. Circuit Breaker

*a. General.* The circuit breaker is a manually reset, double-pole double-throw switch which automatically protects the compressor motor from continuous overcurrent and short circuits. An electrically isolated single-pole double-throw switch protects the control circuits.



ME 4120-268-15/3-21

- |  |   |
|--|---|
| 1 Knob   | 14 Screw, machine, pan head, No. 1-32 x 1 in.         |
| 2 Screw, machine, pan head, No. 8-32 x 1/2 in. (4 rqr) | 15 Nut, self-locking, hex, No. 10-32                  |
| 3 Nut, self-locking, hex, No. 8-32 (4 rqr)             | 16 Washer, lock, No. 10 (2 rqr)                       |
| 4 Lead, electrical                                     | 17 Washer, flat, No. 10 (2 rqr)                       |
| 5 Screw, machine, pan head, No. 8-32 x 1/2 in. (4 rqr) | 18 Washer, flat, aluminum, No. 10 (2 rqr)             |
| 6 Nut, self-locking, hex, No. 8-32 (4 rqr)             | 19 Nut, hex, No. 10-32                                |
| 7 Temperature control                                  | 20 Screw, machine, pan head, No. 6-32 x 1 in. (4 rqr) |
| 8 Grommet  | 21 Nut, self-locking, hex, No. 6-32 (4 rqr)           |
| 9 Screw, machine, pan head, No. 10-32 x 1/2 in.        | 22 Wiring harness                                     |
| 10 Washer, lock, No. 10                                | 23 Spacer   |
| 11 Clamp, loop   | 24 Rivet, blind                                       |
| 12 Plate, mounting                                     | 25 Plate, instruction                                 |
| 13 Switch, selector                                    | 26 Insulation   |
|  | 27 Panel assembly                                     |

*Figure 3-21. Control panel, exploded view.*

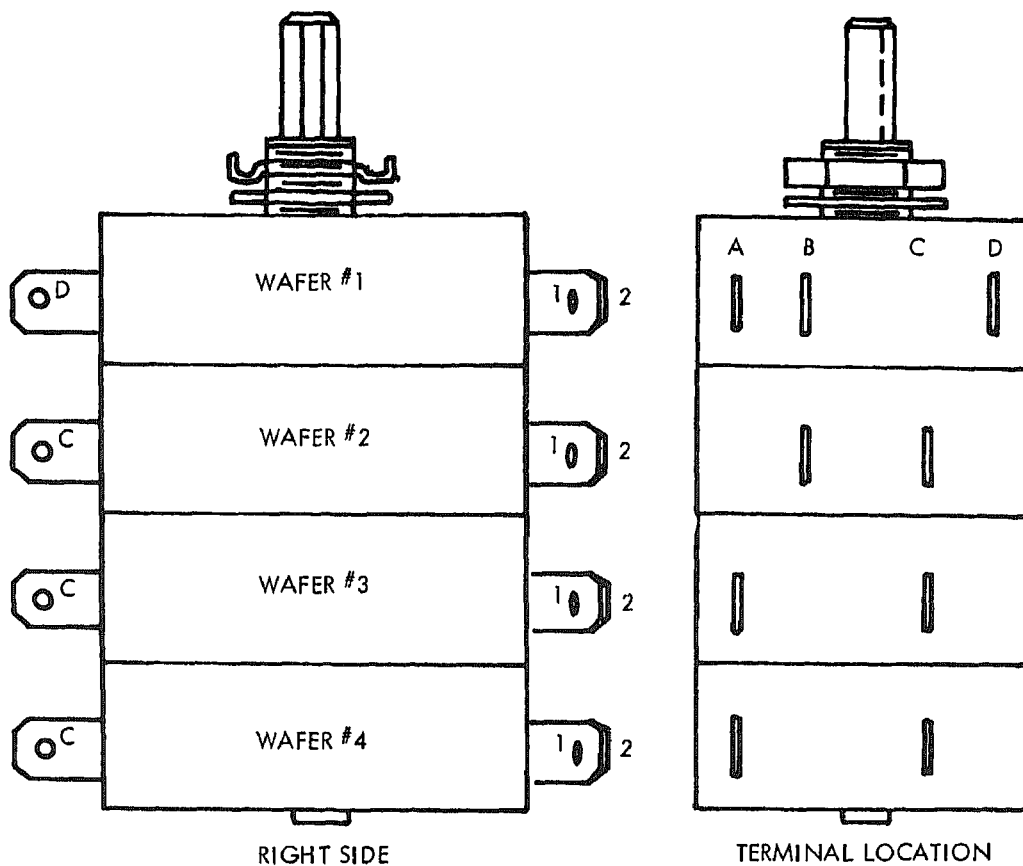
*b. Removal.* Refer to figure 3-24 and remove the circuit breaker from the junction box.

*c. Testing.*

(1) Refer to figure 3-25. With circuit breaker closed, there should be continuity between terminals 1 and 2, 3 and 5, 6 and 7.

(2) With circuit breaker open there should be no continuity between terminals 1 and 2, 3 and 5, 6 and 7. Replace circuit breaker if operation is not as indicated.

*d. Installation.* Refer to figure 3-24 and install circuit breaker in the junction box.



SWITCH POSITION						
	CONTACT NO.	1 HI HEAT	2 LO HEAT	3 OFF	4 VENT	5 COOL
S/W1	2 & A	CLOSED	CLOSED	OPEN	OPEN	OPEN
	2 & B	OPEN	OPEN	OPEN	OPEN	CLOSED
	1 & D	OPEN	OPEN	OPEN	OPEN	CLOSED
S/W2	2 & B	CLOSED	CLOSED	OPEN	CLOSED	CLOSED
S/W3	2 & A	CLOSED	OPEN	OPEN	OPEN	OPEN
S/W4	2 & A	CLOSED	OPEN	OPEN	OPEN	OPEN
	1 & C	CLOSED	OPEN	OPEN	OPEN	OPEN

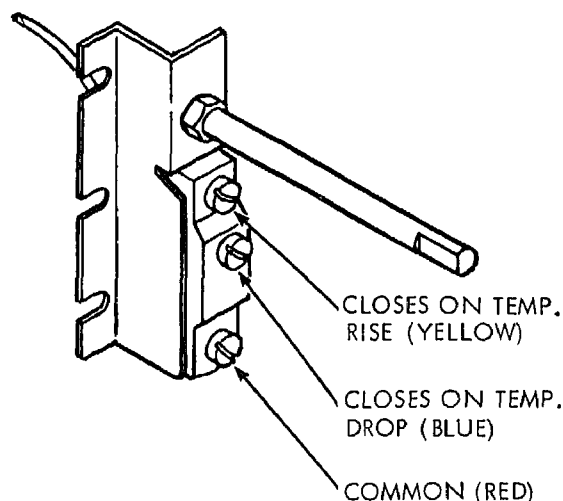
ME 4120-268-15/3-22

Figure 3-22. Selector switch test sequence.

### 3-45. Heater and Motor Relay

a. General. The heater and motor relays are remote controlled three-pole, single-throw

switches which are used to connect the air conditioner electric motors and heaters across the line. The control coils operate on 24V DC provided by a step-down transformer and rectifier



TERMINAL LOCATION  
AND FUNCTION

ME 4120-268-15/3-23

Figure 3-23. Temperature control test points.

circuit. The compressor motor relay is rated at 50 amperes. The evaporator fan motor, condenser fan motor and heater relays are rated at 25 amperes.

*b. Removal.* Refer to figure 3-24 and remove relays from the junction box.

*c. Testing.* See figure 3-26.

(1) *50-ampere relay.*

(a) With relay open, test for continuity across control coil terminals  $X_1$  and  $X_2$ . If coil is open, replace relay.

(b) With relay open, test for continuity across each pair of line and load terminals  $L_1-T_1$ ,  $L_2-T_2$  and  $L_3-T_3$ . If continuity exists, contacts are welded or contact springs are broken, replace relay.

(c) Using a multimeter on high OHMS range, a megger or an insulation tester, test insulation resistance between relay frame and each terminal in turn. If insulation resistance is less than 0.5 megohm, replace relay.

**Caution:** Do not apply test potentials in excess of 230 volts.

(d) Energize control coil using a 24—28V DC source or two 12 volt batteries connected in series. Using a multimeter on lowest OHMS range, test contact resistance across each pair of line and load terminals  $L_1-T_1$ ,  $L_2-T_2$  and  $L_3-T_3$ .

(2) *25-ampere relays.* Proceed as instructed above, noting that line and load terminals are now  $A_1-A_2$ ,  $B_1-B_2$  and  $C_1-C_2$ . Observe same cautions.

*d. Installation.* Refer to figure 3-24 and install relays in junction box.

### 3-46. Time Delay Relay

*a. General.* The time delay relay is a hermetically enclosed, single-pole, single-throw normally open thermal delay relay which keeps the hot gas bypass valve open and prevents operation of the compressor for 30 seconds after the selector switch is placed on "COOL". The time delay relay closes at the end of the delay period and remains closed as long as the air conditioner is on "COOL" mode. Switching to other modes of operation opens the relay. It remains open until the air conditioner is again placed on "COOL" mode, at which time it delays valve and compressor operation as described above.

*b. Removal.* Refer to figure 3-24 and remove the time delay relay assembly from the junction box.

*c. Disassembly.* Do not disassemble for testing. If replacement is indicated, remove time delay relay from its mounting bracket by removing two screws and nuts. Disconnect electrical leads.

*d. Testing.*

(1) Refer to figure 3-27 and place an unpowered 24 volt test lamp across leads B and C.

(2) Apply 24—28V DC from a test source or two 12-volt batteries in series across leads A and C.

(3) Begin timing the relay from the instant DC power is applied until the test lamp lights indicating the relay contacts have closed. Normal delay is 27 seconds to 33 seconds. Replace time delay relay if delay time is not according to specifications.

*e. Reassembly.* Connect electrical leads to time delay relay and mount relay in its bracket. Secure relay to bracket with two screws and nuts.

*f. Installation.* Refer to figure 3-24 and install time delay relay in the junction box.

### 3-47. Transformer

*a. General.* The control circuit transformer is a single-phase, shielded, potted step-down transformer with a 208V AC primary and a 30V AC secondary. After rectification, the resulting 24V DC output is used to energize the motor and heater relays, solenoid valve control coils, and



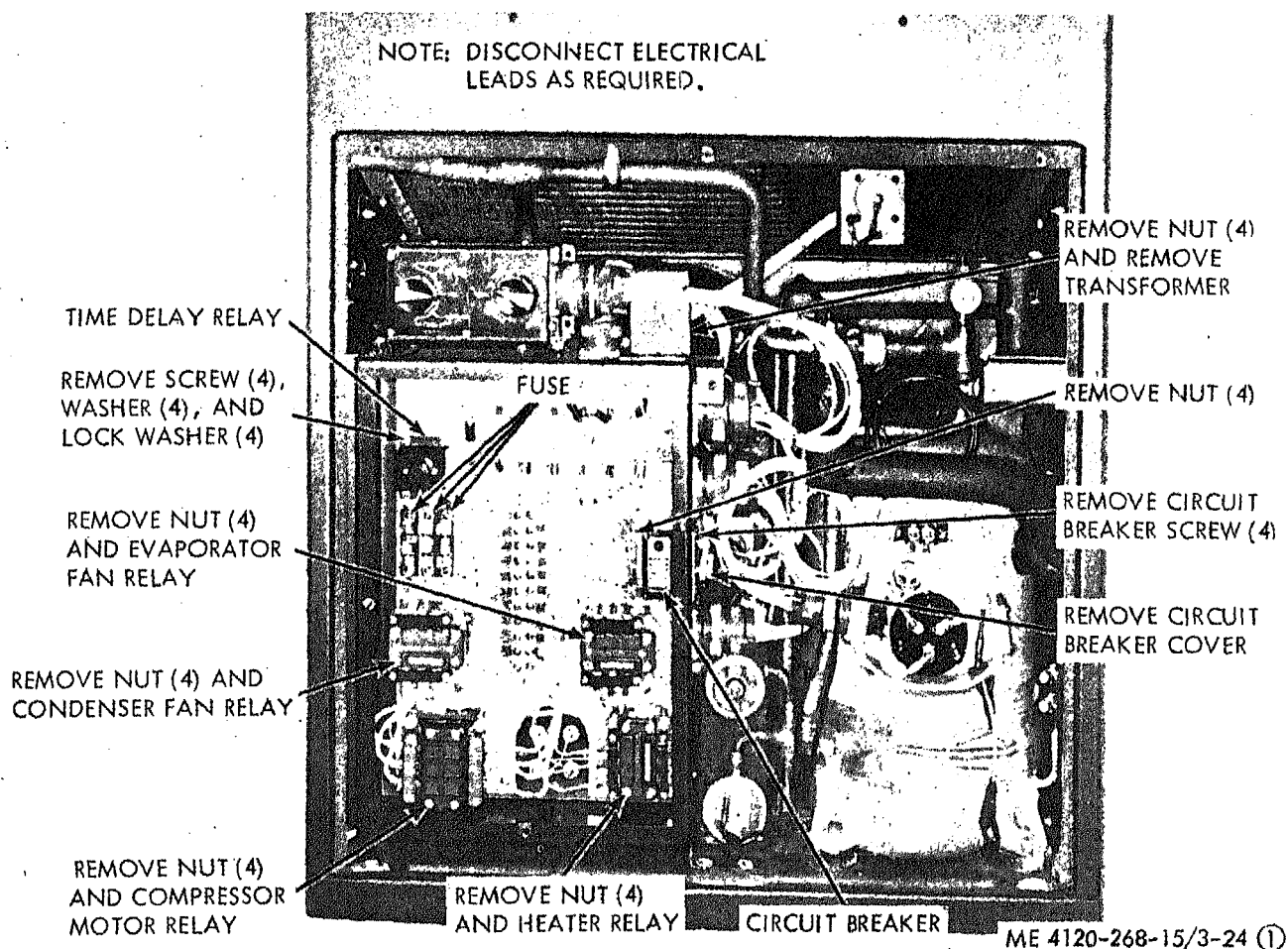


Figure 3-24. Junction box components, removal and installation (Sheet 1 of 2).

**b. Removal.** Refer to figure 3-24 and remove the transformer from the junction box.

**c. Testing.**

(1) Connect a continuity tester or multimeter on low OHMS range across the transformer primary winding. If winding is open, replace transformer.

(2) Connect a continuity tester or multimeter on low OHMS range across the transformer secondary. If winding is open, replace transformer.

(3) Connect an insulation tester, megger or multimeter on high OHMS range between one primary terminal and transformer case. If resistance is less than 0.5 megohm, replace transformer.

(4) Connect an insulation tester, megger or multimeter on high OHMS range between one primary terminal and one secondary terminal. If resistance is less than 0.5 megohm, replace transformer.

**d. Installation.** Refer to figure 3-24 and install transformer in the junction box.

**3-48. Terminal Boards**

**a. General.** Two terminal boards are installed on the junction box plate assembly. One board has ten terminals and the other six.

**b. Removal.** Refer to figure 3-24 and remove the terminal boards.

**c. Inspection.** Inspect the terminal boards for damaged screws and other damage. Replace terminal board if defective.

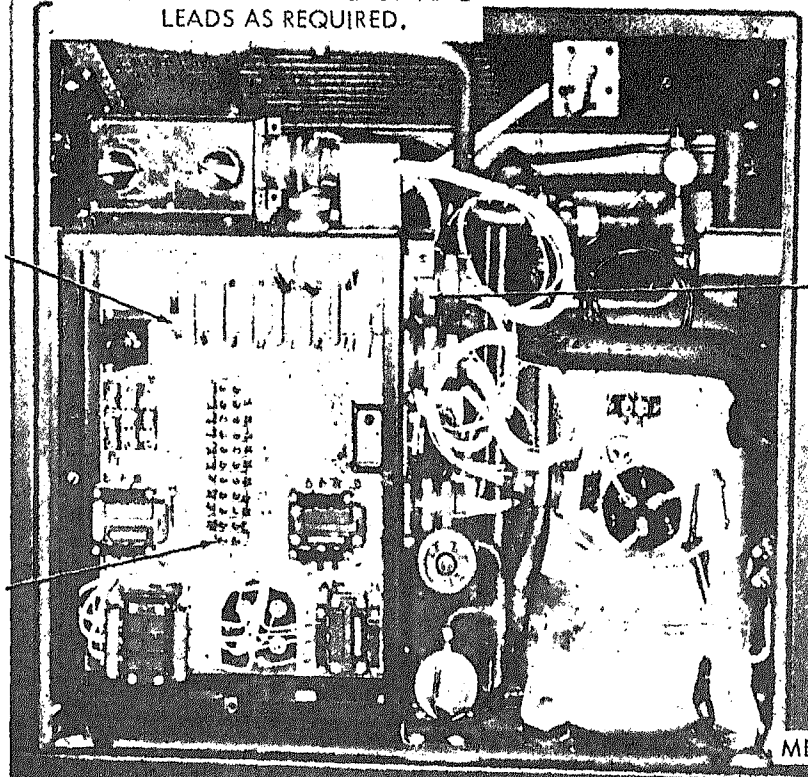
**d. Installation.** Install terminal boards (fig. 3-24).

**3-49. Electrical Receptacles**

**a. General.** Four receptacle connectors, each a part of a wiring harness, are attached to the junction box.

REMOVE SCREW (4),  
WASHER (4), LOCK  
WASHER (4), AND  
TERMINAL BOARD

REMOVE SCREW (4),  
WASHER (4), LOCK  
WASHER (4), AND  
TERMINAL BOARD



REMOVE SCREW (4),  
NUT (4) AND  
WIRING HARNESS

REPEAT PROCEDURE  
FOR OTHER WIRING  
HARNESS

ME 4120-268-15/3-24 (2)

Figure 3-24. Junction box components, removal and installation (Sheet 2 of 2).

b. *Removal.* Refer to figure 3-24 and remove wiring harnesses as required.

c. *Disassembly.* Do not remove electrical leads from receptacle connectors unless inspection indicates replacement is necessary.

d. *Inspection.* Inspect for broken or cracked receptacle connectors. Inspect leads for loose connections and broken insulation. Check for continuity between connector contacts and corresponding lead terminals. Replace defective parts or wiring harness.

e. *Assembly.* Install leads in connector.

f. *Installation.* Install wiring harness (fig. 3-24).

places one bank of heaters in operation on command from the temperature control thermostat. Placing the selector switch in "HI HEAT" activates the second bank of heaters, which operates continuously in addition to the controlled bank.

b. *Removal.* Refer to figure 3-28 and remove the heating elements from air conditioner.

c. *Testing.* Using a multimeter set on low OHMS range, check resistance across each heating element in turn. Normal reading is  $12 \pm 5$  ohms. Replace heating element if resistance is not as specified.

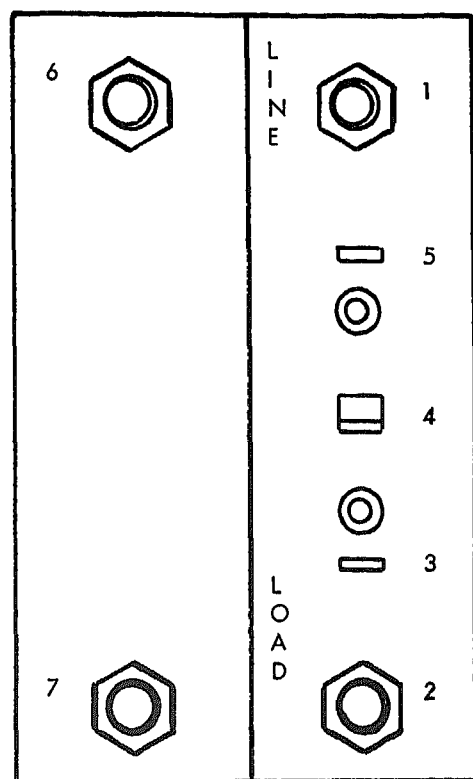
d. *Installation.* Refer to figure 3-28 and install heating elements in air conditioner.

### 3-50. Electric Heating Elements

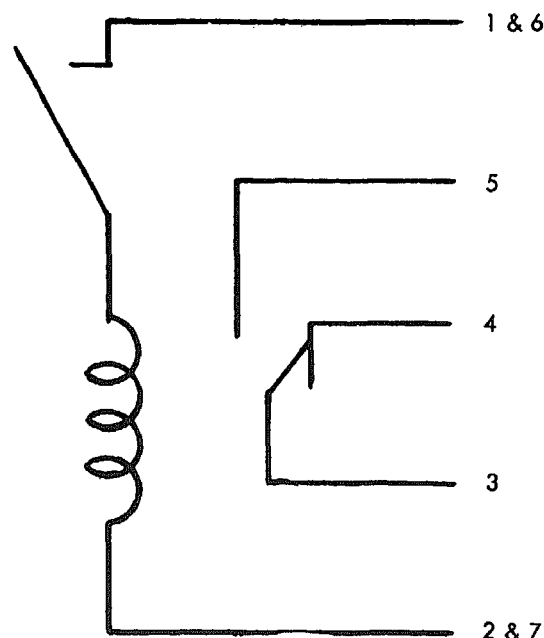
a. *General.* Two banks of three electrical heaters each are mounted directly behind the evaporator coil, in the conditioned air stream, and provide heat on command from the temperature control thermostat to maintain the selected ambient temperature. Placing the selector switch on "LO HEAT" starts the evaporator blower and

### 3-51. Heater Thermostatic Switch

a. *General.* The heater thermostatic switch is a three-pole, single-throw, automatic reset thermal overload and overcurrent protector which prevents the heaters from operating at discharge temperatures in excess of  $190^\circ \pm 40^\circ\text{F}$  regardless of selector switch and temperature control thermostat settings. Normal heater operation resumes



TERMINAL  
LOCATION



SCHEMATIC  
(CIRCUIT BREAKER OPEN)

ME 4120-268-15/3-25

Figure 3-25. Circuit breaker test points.

automatically at  $140^{\circ} \pm 40^{\circ}\text{F}$  discharge air temperature.

*Note.* Normally, cutout temperature will be reached only if evaporator fan motor stops due to malfunction or if fans are damaged or seized.

*b. Removal.* Refer to figure 3-28 and remove the heater thermostatic switch.

*c. Disassembly.* Disconnect electrical leads from heater thermostatic switch. Do not disassemble further.

*d. Testing.* Using a continuity tester or a multimeter set on low OHMS range, test for continuity between each pair of terminals. Replace heater thermostatic switch if an open reading is obtained.

*e. Reassembly.* Connect electrical leads to heater thermostatic switch.

*f. Installation.* Refer to figure 3-28 and install heater thermostatic switch on heater support assembly.

### 3-52. Pressure Equalizer Solenoid Valve Coil

*a. General.* The pressure equalizer solenoid valve is a normally open, pilot operated valve

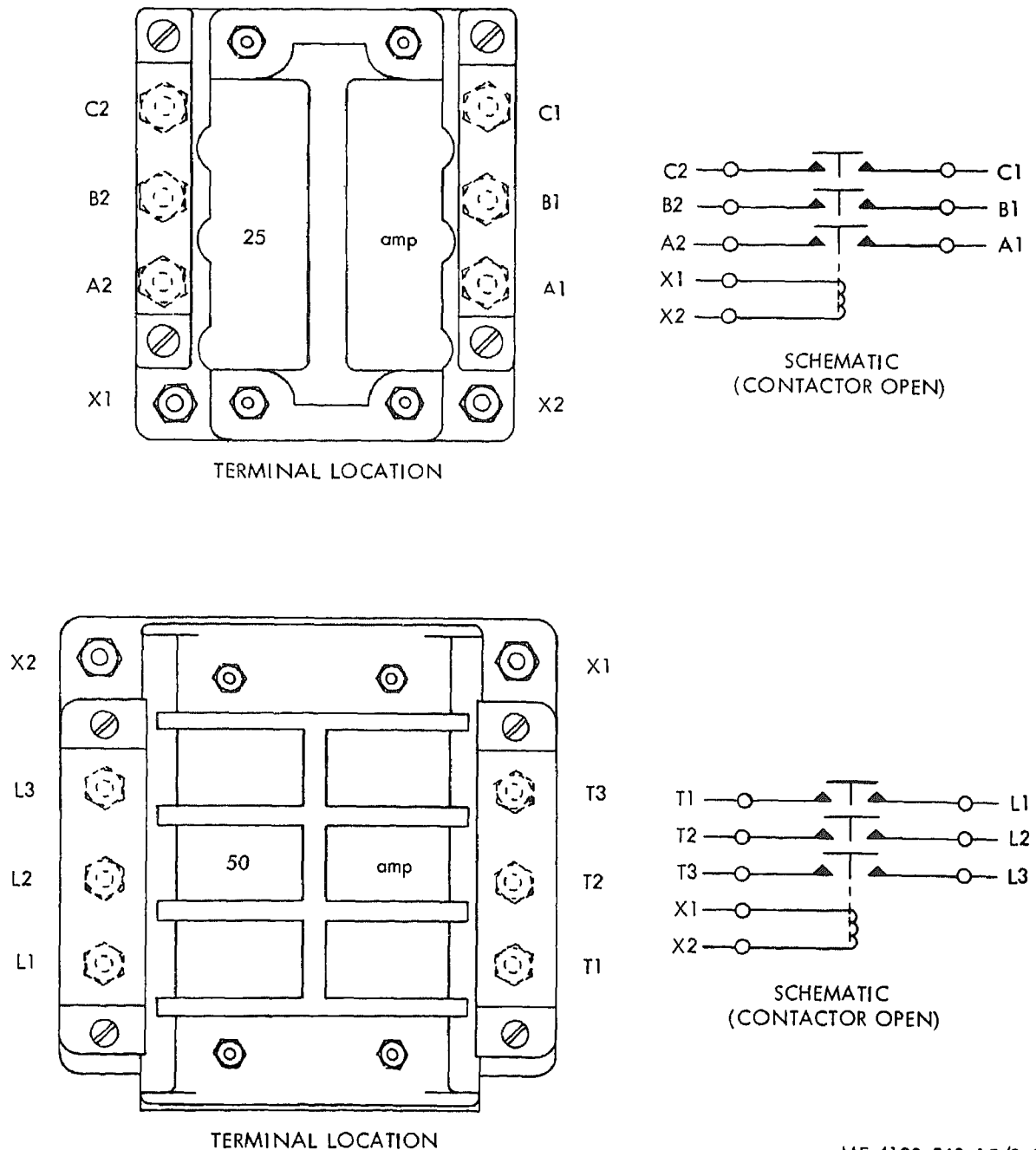
which remains closed while the selector switch is on "COOL". The hot gas bypass valve opens whenever the selector switch is moved to another position, bypassing refrigerant gas under pressure in the discharge line to the compressor suction line. Moving the selector switch to "COOL" permits the hot gas bypass valve to close after the 30-second delay provided by the time delay relay.

#### *b. On-Equipment Testing.*

(1) Start the air conditioner. If the valve clicks closed, place hand on the downstream piping. If the piping begins to cool immediately, the valve is operating properly. If valve does not operate as specified, it must be replaced.

(2) If the hot gas bypass solenoid valve fails to click closed after a 30-second delay, stop the unit and check the electrical connection and the solenoid coil.

(3) Refer to figure 3-29 and disconnect the electrical plug connector. Test the solenoid control coil at the electrical receptacle connector, placing a continuity tester or a multimeter set on



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Figure 3-26. Heater and motor relays test points.

low OHMS range, across each pin. If continuity does not exist, replace control coil.

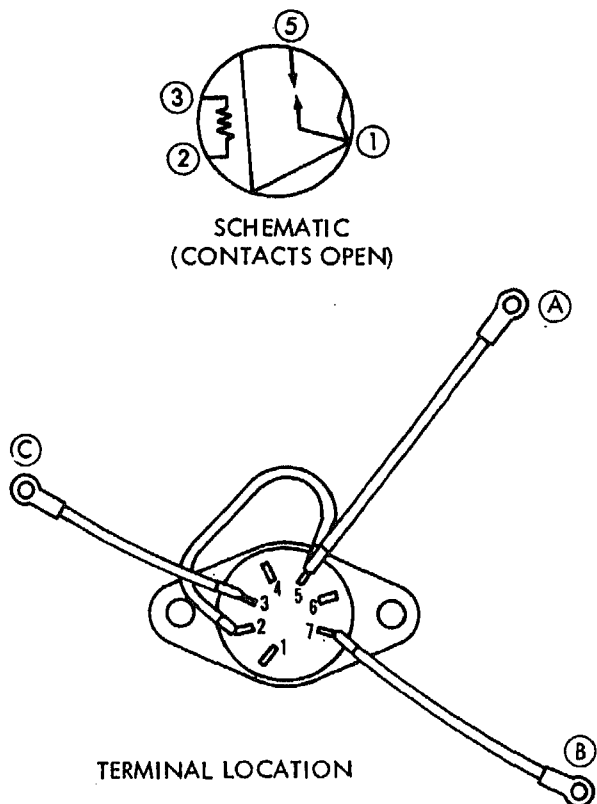
(4) Using a multimeter set on high OHMS range, measure resistance between one of the jack pins and the air conditioner frame. If resistance reading is less than 0.5 megohm, replace control coil.

c. *Coil Removal.* Refer to figure 3-29 and remove solenoid valve coil.

d. *Coil Installation.* Refer to figure 3-29 and install solenoid valve coil.

### 3-53. Liquid Line Solenoid Valve

a. *General.* The liquid line solenoid valve is a normally open pilot operated valve which automatically closes and opens on command from the air conditioner temperature control's thermo-



ME 4120-268-15/3-27

Figure 3-27. Time delay relay test points.

position. In the open position, the liquid line solenoid valve allows flow of liquid refrigerant from the condenser to the evaporator coil. In the closed position, the liquid line solenoid valve

blocks the flow of liquid refrigerant to the evaporator coil.

#### b. On-Equipment Testing.

(1) Turn the temperature selector thermostat 5°—10°F below ambient temperature to assure refrigerant system will operate on the cooling cycle. Start air conditioner and place hand on the downstream piping. If the piping begins to warm immediately, the valve is operating properly. If valve does not operate as specified, it must be replaced.

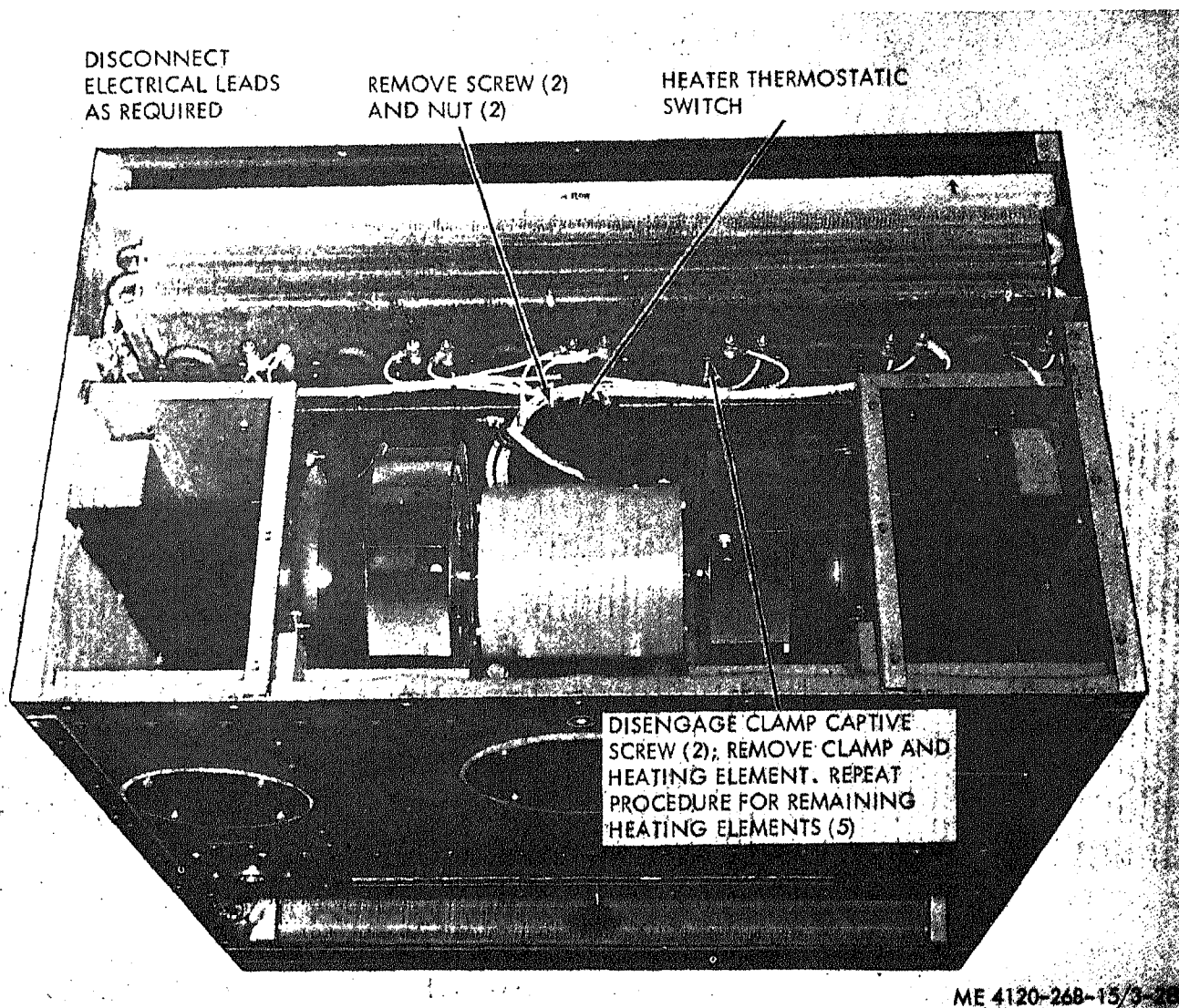
(2) Turn temperature control thermostat 5°—10°F above ambient temperature to place refrigerant system on bypass cycle. The liquid line solenoid valve should immediately click closed. Place hand on the downstream piping. If the piping begins to cool immediately the valve is operating properly. If valve does not operate as specified, it must be replaced.

(3) If valve fails to click closed, stop air conditioner and test coil according to instructions in paragraph 3-52. Follow instructions in paragraph 3-52 for coil replacement.

### 3-54. High and Low Pressure Cutout Switches

a. *Testing Switch Assembly.* Refer to figure 6-10 and disconnect electrical connector from high and low pressure cutout switch assembly. Test for continuity across the connector pins with a multimeter set on OHMS. If no continuity is indicated, press the reset button and recheck. If no continuity is indicated check for loose connections and test individual switches.

b. *Testing Switches.* Refer to figure 6-10 and partially remove switches. Do not disconnect tubing nuts. Test each switch for continuity across switch terminals.



ME 4120-268-15/3-28

*Figure 3-28. Heating elements and thermostatic switch, removal and installation.*

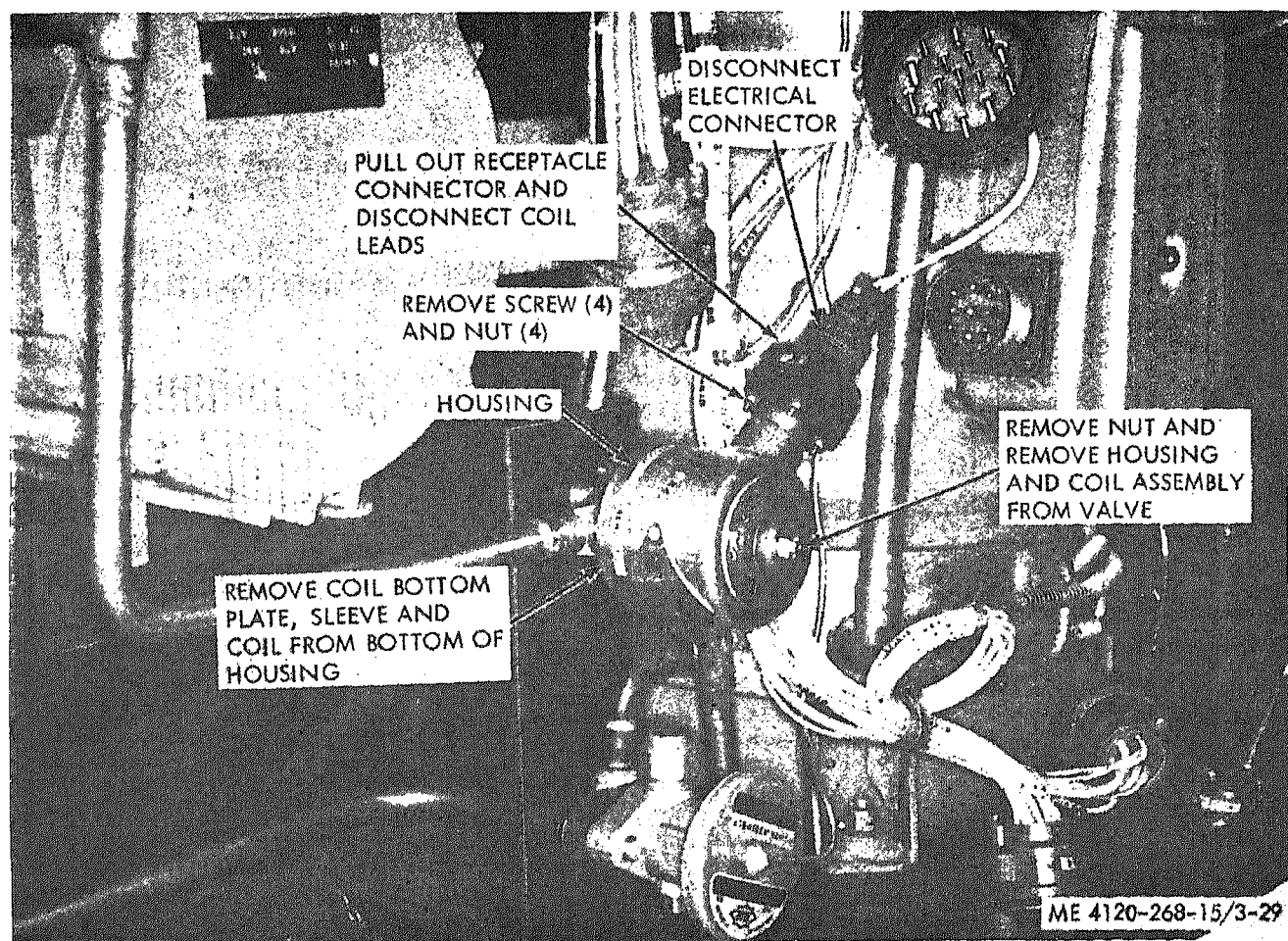


Figure 3-29. Solenoid valve coil, removal and installation.

## Section XI. COMPRESSOR

### 3-55. General

The compressor and motor assembly is a hermetically sealed unit and is repairable in the field. If there is a mechanical failure in the compressor or a motor burnout, the entire compressor must be replaced. The motor may be tested without removing the compressor from the air conditioner.

### 3-56. Compressor Motor Test

a. Disconnect receptacle connector from compressor junction box.

b. Refer to wiring diagram and test continuity across each combination of two motor terminals. Lack of continuity indicates an open winding. Test for continuity between two overload protector contacts.

c. Place one contact of the tester against com-

pressor housing and the other against the motor terminals one at a time. If a circuit is indicated, the motor is grounded.

d. Test the motor stator for insulation resistance as instructed in TM 5-764. The insulation resistance should measure not less than 0.5 megohms for the motor on either model.

e. Replace compressor if motor or overload protector is defective.

*Note.* The resistance measurement should be used only as a general guide, taking into consideration the accuracy of the instrument used, test lead resistance, and ambient temperature at time of test. If more precise measurement is required, an instrument such as a Kelvin or Wheatstone bridge should be used, or comparative measurement between the suspected component and a like item known to be good should be utilized. In all cases where a megohmmeter is used for testing, make certain that the unit is thoroughly dry. Wet condemnation tolerances should be considered.



### 3-57. Compressor Crankcase Heater

*a. General.* The compressor crankcase heater provides heat to prevent sludging and oil pumping problems when the compressor is exposed to low ambient temperatures. It is a 208 volt, 120 watt resistance heater enclosed within tubing and protected by a thermally insulated cover.

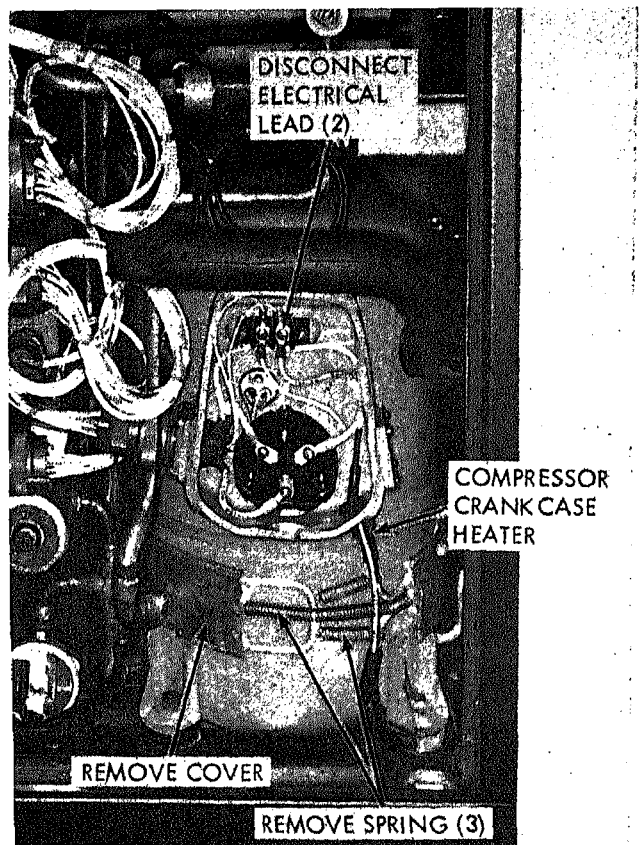
#### *b. On-Equipment Test.*

(1) Disconnect receptacle connector from compressor junction box and test for continuity between heater contacts.

(2) If an open circuit is indicated, remove compressor junction box cover. Disconnect crankcase heater and check for continuity in heater. If open, replace heater.

*c. Removal.* Refer to figure 3-30, and remove the crankcase heater.

*d. Installation.* Install in reverse order of removal as illustrated in figure 3-30.



ME 4120-268-15/3-30

*Figure 3-30. Compressor crankcase heater, removal and installation.*



# CHAPTER 4

## DIRECT AND GENERAL SUPPORT AND DEPOT MAINTENANCE INSTRUCTIONS

### Section I. GENERAL

#### 4-1. Scope

a. These instructions are published for the use of direct and general support and depot maintenance personnel maintaining the Trane Model MAC4V40-340-3 and MAC6V40-340-2 Air Conditioners. They provide information on the maintenance of the equipment, which is beyond the scope of the tools, equipment, personnel, or supplies normally available to using organizations.

b. Report all equipment improvements, recommendations as prescribed by TM 38-750.

#### 4-2. Record and Report Forms

For record and report forms applicable to direct and general support and depot maintenance, refer to TM 38-750.

*Note.* Applicable forms, excluding Standard Form 46 which is carried by the operator, shall be kept in a canvas bag mounted on the equipment.

### Section II. DESCRIPTION AND TABULATED DATA

#### 4-3. Description

For a complete description of the air conditioner, see paragraph 1-3.

#### 4-4. Tabulated Data

a. *General.* This paragraph contains all the overhaul data pertinent to direct and general support and depot maintenance personnel.

##### b. Air Conditioner Classification and Rating.

Model	MAC4V40-340-3	MAC6V40-340-2
Cooling capacity	36,000 BTU/H	36,000 BTU/H
Heating capacity:		
Hi-heat	33,000 BTU/H	30,000 BTU/H
Lo-heat	16,500 BTU/H	15,000 BTU/H
Ventilating capacity.	1,300 CFM	1,300 CFM
Operating Voltage.	208V AC	208V AC
Phase	3	3
Frequency	400 cycles	60 cycles
Current input, FL:		
Cooling	47 amperes	30 amperes
Hi-heat	27 amperes	26 amperes
Lo-heat	15 amperes	14 amperes
Ventilating	3.0 amperes	2.6 amperes

##### Power input:

Cooling	10.9 KW	9.2 KW
Hi-heat	9.2 KW	9.1 KW
Ventilating	0.8 KW	0.7 KW

*Note.* Locked rotor (LR) current input is approximately 4 times full load (FL) current input.

##### c. Compressor Classification and Rating.

Type	Reciprocating piston, hermetically sealed.
Number of cylinders	2
Bore	2 inches
Stroke	31/82 inches
Displacement	6.00 cubic inches (approx.)
Lubrication	Forced feed
Crankcase capacity	4 pints
Crankcase heater	120 watts
Motor rating	4 HP
Motor protection	External circuit breaker and internal automatic reset thermal overload cutout.

##### d. Condenser Fan Motor Classification and Rating.

Type	Induction, squirrel cage rotor single shaft
Duty	Continuous
Drive	Direct

Protection ----- Automatic reset internal thermal overload and over current.

Model -----	MAC4V40-340-3	MAC6V40-340-2
Rating -----	2.2 HP	1.7 HP
Voltage -----	208V AC	208V AC
Phase -----	3	3
Frequency -----	400 cycles	60 cycles
Speed -----	1900 rpm	1725 rpm

#### *e. Evaporator Fan Motor Classification and Rating.*

Type ----- Induction, squirrel cage rotor, double extended shaft.

Duty ----- Continuous

Drive ----- Direct

Protection ----- Automatic reset internal thermal overload and overcurrent.

Model -----	MAC4V40-340-3	MAC6V40-340-2
Rating -----	.90 HP	.70 HP
Voltage -----	208V AC	208V AC
Phase -----	3	3
Frequency -----	400 cycles	60 cycles
Speed -----	3600 rpm	3450 rpm

#### *f. Electric Heaters Classification and Rating.*

Type ----- Folded, stainless steel-sheathed tubular elements.

Rating at 120V ----- 1400 watts each

Duty ----- Continuous

Protection ----- Automatic reset external overload and overcurrent.

#### *g. Temperature control Thermostat Classification and Rating.*

Type ----- Single pole, double-throw, normally closed bimetallic element.

Range ----- +40°F to +90°F

Closing differential ----- 2° ± 1°F

#### *h. Selector Switch Classification and Rating.*

Type ----- Rotary, five positive detent positions.

Rating ----- 15 amperes at 208V AC

#### *i. Heater Thermostatic Switch Classification and Rating.*

Type ----- Automatic reset thermal overload and overcurrent, normally closed.

Range ----- Closed 140° ± 9°F; open 194° ± 9°F

Rating ----- 180 amperes minimum at 208V AC

#### *j. Relay Classification and Rating.*

Type ----- Three-pole, single-throw, normally open, class A5.

Duty ----- Continuous

Control coil ----- 28V DC

#### *Rating:*

(1) ----- 50 amperes at 208V AC (1 per unit)

(2) ----- 25 amperes at 208V AC (3 per unit)

#### *k. Time Delay Relay Classification and Rating.*

Type ----- Single-pole, single-throw, normally open, thermal delay, hermetically sealed.

Delay ----- 30 seconds ± 3 seconds

Rating ----- 3 amperes at 28V DC

#### *l. Circuit Breaker Classification and Rating.*

Type ----- Manual reset double-pole, double-throw with single-pole, single-throw auxiliary.

#### *Trip time, main breaker:*

Locked rotor ----- 1.5—6.0 seconds

Rated overload ----- 30 minutes maximum

Rating, main breaker	MAC4V40-340-3	MAC6V40-340-2
----------------------	---------------	---------------

Must hold ----- 31.7 amperes 28.0 amperes

Must trip ----- 39.2 amperes 32.2 amperes

Rating, auxiliary ----- 2.5 amperes at 250VAC

#### *m. Transformer Classification and Rating.*

Type ----- Stepdown, single phase

Input voltage ----- 208V AC

Output voltage ----- 30V AC

Output current ----- 2.2 amperes continuous; 7.7 amperes surge.

#### *n. Rectifier Classification and Rating.*

Type ----- Silicon rectifier full-wave bridge, stud mount case.

Input voltage ----- 30V AC

Output voltage ----- 24V AC

Output current ----- 3.0 amperes maximum

#### *o. RFI Filter Classification and Rating.*

Type ----- Feed through

Rating ----- 5 amperes at 250V AC

#### *p. Expansion Valve Classification and Rating.*

Type ----- Compensated thermal expansion, remote bulb.

Superheat ----- 3.6 ton—10° ± 1 1/4°F

2.1 ton—32° ± 1/2°F

Rating ----- 3.6 tone (1 per unit) and 2.1 ton (1 per unit)

#### *q. High Pressure Cutout Switch Classification and Rating.*

Type ----- Manual reset, normally closed pressure operated single-pole, single-throw.

Trip pressure ----- 450 ± 10 psig (pounds per square inch gage).

Reset pressure ----- 400 psig

*r. Low Pressure Cutout Switch Classification and Rating.*

Type ..... Manual reset, normally  
closed pressure operated  
single-pole, single-throw.

Trip pressure .....  $7 \pm 5$  psig

Reset pressure .....  $12 \pm 5$  psig

*s. Solenoid Valve Classification and Rating.*

Type ..... Normally open, pilot op-  
erated with integral seat  
and resilient disc.

Coil voltage:

Pull-in ..... 20.4V DC

Release ..... 18.0V DC  
Coil current ..... 0.51 amperes (holding)

*t. Back Pressure Regulating Valve Classification and Rating.*

Type ..... Pressure operated, normally  
closed.

Operating range ..... 0—90 psig

Opening pressure ..... 58 psig preset, adjustable.

*u. Pressure Relief Valve Classification and Rating.*

Type ..... Spring loaded, normally  
closed, non-adjustable.

Release pressure ..... 540 psig.



## CHAPTER 5

### GENERAL MAINTENANCE INSTRUCTIONS

#### Section I. SPECIAL TOOLS AND EQUIPMENT

##### 5-1. Special Tools and Equipment

No special tools or equipment are required to perform direct and general support and depot maintenance on the air conditioner.

##### 5-2. Specially Designed Tools and Equipment

No specially designed tools and equipment are required to perform direct and general support and depot maintenance on the air conditioner.

#### Section II. TROUBLESHOOTING

##### 5-3. General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the air conditioner or any of its components. Each trouble symptom stated is followed by a list of probable causes. The possible remedy recommended is described opposite the probable cause.

##### 5-4. Compressor Fails to Start

Probable cause	Possible remedy
Defective selector switch	Test selector switch (para 3-41). Replace if defective.
Defective circuit breaker	Test circuit breaker (para 3-44). Replace if defective.
Defective compressor motor relay.	Test relay (para 3-45). Replace if defective.
Defective time delay relay	Test time delay relay (para 3-45). Replace if defective.
Defective compressor motor protective relay.	Test relay (para 3-56). Replace compressor if relay is defective (para 5-15).
Open or shorted control circuits.	Perform continuity tests (para 3-40). Repair or replace defective component.
Defective compressor motor	Test compressor or motor (para 3-56). Replace compressor if motor is defective (para 5-15).
Compressor damaged internally.	Replace compressor (para 5-15).
Defective control circuit transformer.	Test transformer (para 3-47). Replace if defective.

Probable cause	Possible remedy
Defective control circuit rectifier.	Test rectifier (para 3-22). Replace if defective (para 3-21).
Defective RFI filters	Test filters (para 3-22). Replace if defective (para 3-21).
Shorted control coil in pressure equalizer bypass solenoid valve.	Test control coil (para 3-52). Repair or replace if defective.

##### 5-5. Compressor Starts Normally, but Stops on Overload

Probable cause	Possible remedy
Incorrectly set or defective thermal expansion valves.	Set thermal expansion valves to correct superheat (para 6-5). Replace thermal expansion valves if correct adjustment cannot be obtained or if valves fail to modulate refrigerant flow correctly.
Defective liquid line or equalizer line solenoid valves.	Test control coils (para 3-52 and 3-53). Check valves for positive opening and closing. Replace solenoid valves if defective (para 6-6 and 6-7).
Bent or kinked refrigerant tubing.	Visually inspect all tubing for damage. Replace damaged sections (para 6-4).
Overcharge of refrigerant	Carefully open pressure line access valve with air conditioner operating and bleed excess refrigerant (para 6-16).

## 5-6. Reduced Cooling Capacity

Probable cause	Possible remedy
Dirty, clogged or damaged evaporator coil.	Clean evaporator coil (para 3-31). Repair or replace if damaged.
Evaporator coil frosting -----	Adjust back pressure regulating valve to specification (para 6-10). Replace valve if correct adjustment cannot be obtained.
Insufficient refrigerant in system.	Test, evacuate and recharge system (para 6-17 and 6-18).
Defective temperature control.	Test temperature control (para 3-41). Replace if defective.
Incorrectly set or defective thermal expansion valves.	Set valves to correct superheat (para 6-5). Replace valves if correct adjustment cannot be obtained or if valves fail to modulate refrigerant flow correctly.
Defective solenoid valves -----	Test control coils (para 3-52 and 3-53). Check valves for positive opening and closing. Replace defective valves (para 6-6 and 6-7).
Defective evaporator fan motor.	Test motor (para 3-37). Repair or replace if defective.

## 5-7. System Malfunction or Combination of Malfunctions

Probable cause	Possible remedy
Abnormal system operating pressures.	Perform operating pressure test (para 6-2).
<b>LOW SUCTION PRESSURE</b>	
Conditioned area temperature excessively low.	Raise thermostat temperature setting.
Restricted air flow over evaporator.	Clean evaporator coil (para 3-31), air filters (para 3-25) and grilles and screens.
Incorrectly set or defective expansion valves.	Set valves to correct superheat (para 6-5). Replace if defective.
Insufficient refrigerant -----	Test, evacuate and recharge system (para 6-17 and 6-18).
Restricted suction line -----	Replace damaged sections (para 6-4).
Incorrectly set or defective suction pressure regulating valve.	Set valve to specification (para 6-10). Replace if defective.
Defective compressor -----	Replace compressor (para 5-15).

### HIGH SUCTION PRESSURE

Conditioned area temperature excessively high.	Normal operation; self correcting as temperature drops.
Incorrectly set or defective expansion valves.	Set valves to correct superheat (para 6-5). Replace if defective.

Probable cause	Possible remedy
Defective hot gas bypass solenoid valve.	Test valve (para 3-52). Replace if defective (para 6-6).
Defective compressor -----	Replace compressor (para 5-15).
<b>LOW DISCHARGE PRESSURE</b>	
Insufficient refrigerant -----	Test, evacuate and recharge system (para 6-17 and 6-18).
Defective compressor -----	Replace compressor (para 5-15).
<b>HIGH DISCHARGE PRESSURE</b>	
Restricted air flow over condenser.	Clean condenser coil (para 3-33) grilles and screens.
Incorrectly set or defective expansion valves.	Set valves to correct superheat (para 6-5). Replace if defective.
Defective solenoid valves -----	Test valves (para 3-52 and 3-53). Replace if defective (para 6-6 and 6-7).
Restricted discharge line -----	Replace damaged sections (para 6-4).
Excessive refrigerant -----	Bleed excess refrigerant (para 6-16).

## 5-8. Blower Motor Fails to Start or Stops on Overload

Probable cause	Possible remedy
Defective selector switch -----	Test selector switch (para 3-41). Replace if defective.
Defective fan motor relay ---	Test relay (para 3-45). Replace if defective.
Defective fan motor protective relay.	Test relay (para 3-37). Replace if defective.
Open or shorted control circuits.	Perform continuity tests (para 3-40). Repair or replace defective component.
Defective fan motor -----	Test motor (para 3-37). Repair or replace if defective.
Defective control circuit transformer.	Test transformer (para 3-47). Replace if defective.
Defective control circuit rectifier.	Test rectifier (para 3-22). Replace if defective.
Defective RFI filters -----	Test RFI filters (para 3-22). Replace if defective.

## 5-9. No Heat in "Heat" Position

Probable cause	Possible remedy
Defective selector switch -----	Test selector switch (para 3-41). Replace if defective.
Defective temperature control.	Test temperature control (para 3-41). Replace if defective.

Probable cause	Possible remedy
Defective heater thermostatic switch.	Test heater thermostatic switch (para 3-51). Replace if defective.
Defective or damaged heater elements.	Test heaters (para 3-50). Replace if damaged or defective.
Defective heater relay	Test relay (para 3-45). Replace if defective.
Open or shorted control circuits.	Perform continuity tests (para 3-40). Repair or replace defective component.
Defective control circuit transformer.	Test transformer (para 3-47). Replace if defective.
Defective control circuit rectifier.	Test rectifier (para 3-22). Replace if defective.
Defective RFI filters capacitors.	Test RFI filters (para 3-22). Replace if defective.

## 5-10. Reduced Heating Capacity

Probable cause	Possible remedy
Restricted air flow over heaters.	Clean evaporator coil (para 3-31), air filters (para 3-25 and 3-26) and grilles.
Defective selector switch ("LO HEAT" only).	Test selector switch (para 3-41). Replace if defective.
Defective temperature control.	Test temperature control (para 3-41). Replace if defective.
Defective or damaged heater elements.	Test heaters (para 3-50). Replace if damaged or defective.

## 5-11. Inoperative Compressor Crankcase Heater

Probable cause	Possible remedy
Defective or damaged heating element.	Test heater (para 3-57). Replace if damaged or defective.

## Section III. REMOVAL AND INSTALLATION OF MAJOR COMPONENTS OR AUXILIARIES

### 5-12. General

a. The air conditioner, after it is started, is automatic in operation. The relationship of the automatic components, controls, and instruments, is explained in the operating cycle description for maintenance of the air conditioner (para 5-13). A refrigerant flow diagram (fig. 5-1) and wiring diagrams (fig. 1-4) are included to assist in the maintenance of the electrical components, wiring harness, wire leads, and refrigerant components.

b. Generally, parts and assemblies may be removed for replacement from the air conditioner without the necessity of removing a major assembly of which it is a component. The electrical system and the refrigerant piping system, each consisting of a number of components connected together to form the system, cannot be removed as complete units. Repair and replacement of components are covered in chapter 6 except as noted in c below.

c. Removal and installation procedures for the evaporator coil, condenser coil, compressor, casing, and base are contained in this chapter.

**Warning:** Disconnect the air conditioner from the power source before performing any maintenance on the components of the unit.

### 5-13. Description of Operating Cycle

a. *General.* The type and degree of air conditioning provided by the unit is controlled by

a five-position selector switch and a temperature control.

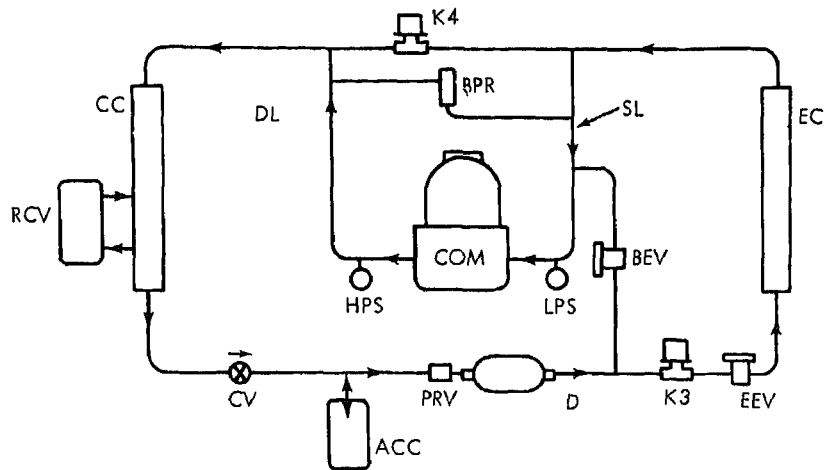
(1) The compressor crankcase heater is in constant operation to prevent sludging and oil pumping problems.

(2) Placing the selector switch in the HI-HEAT position actuates the blower motor with both banks of evaporator heaters being under the control of the temperature control. If the air temperature falls below the set point of the temperature control the control contacts close, energizing contactors which supply power to the heaters through the normally closed contacts of the heater thermostatic switch.

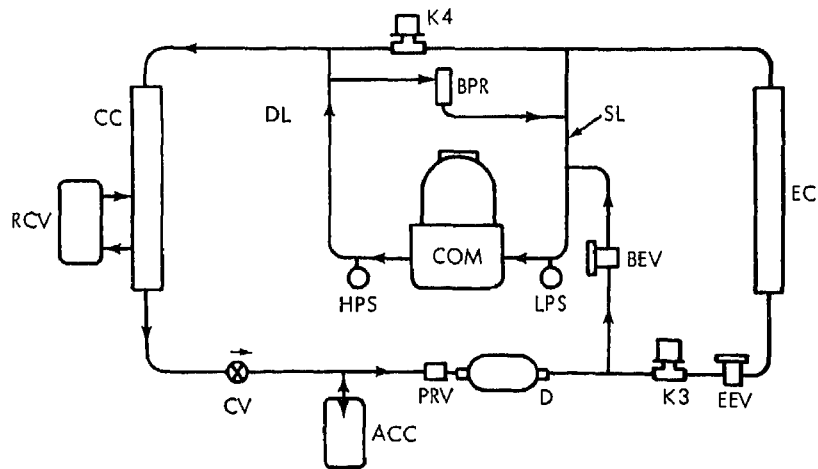
(3) Moving the selector switch to the LO-HEAT position presents the same control sequence but reduces the heating capacity of the unit by supplying power to a single bank of heaters only.

(4) The blower motor starts when the selector switch is placed in the VENTILATE position.

(5) In the "COOL" position, the blower motor is in operation and the compressor motor contactor is energized through the normally closed contacts of the circuit breaker and the compressor overload protector. After the blower motor and compressor have started, the flow within the refrigerant system is controlled by the temperature control thermostat. Sensing a rise in the air temperature above the set point, the temperature control thermostat closes, positioning



A. COOLING CYCLE OF OPERATION



B. BYPASS CYCLE OF OPERATION

#### DEVICE LEGEND

ACC	ACCUMULATOR	EEV	EVAPORATOR FEED THERMAL EXPANSION VALVE
BEV	BYPASS THERMAL EXPANSION VALVE	K3	LIQUID LINE SOLENOID VALVE
BPR	BACK PRESSURE REGULATOR VALVE	K4	PRESSURE EQUALIZER SOLENOID VALVE
CC	CONDENSER COIL	PRV	PRESSURE RELIEF VALVE
COM	COMPRESSOR	RCV	RECEIVER
CV	CHECK VALVE	SL	SUCTION LINE
D	DEHYDRATOR	S5	HIGH PRESSURE CUTOFF SWITCH
DL	DISCHARGE LINE	S6	LOW PRESSURE CUTOFF SWITCH
EC	EVAPORATOR COIL		



the valves for cooling service. Sensing a fall in the air temperature below the set point, the contacts of the temperature control thermostat open, positioning the valves for bypass service.

*b. Compressor Operation.* The compressor delivers refrigerant gas to the condenser at the correct pressure and temperature required for condensation. A system of solenoid and expansion valves directs the liquid refrigerant to the evaporator coil for conditioned area cooling. When the desired temperature is attained, the same valves bypass the evaporator coil to prevent further cooling of the conditioned area. The compressor operates continuously whenever the selector switch is on "COOL" to prevent voltage fluctuations in the power line. A time delay relay keeps the hot gas bypass valve open and prevents operation of the compressor for 30 seconds after initial startup.

*Note.* Pressure equalizer solenoid valve K<sub>1</sub> remains closed at all times during cooling cycle and bypass cycle operation. It opens when the selector switch is moved from "COOL" position and remains open for 30 seconds after selector switch is returned to "COOL" position.

*c. Cooling Cycle of Operation.* When the conditioned area temperature rises above the temperature control thermostat setting, a set of contacts opens, permitting liquid line solenoid valve K<sub>1</sub> to return to its normally open position. Liquid refrigerant is metered to the evaporator coil by thermal expansion valve EEV. Thermal expansion valve BEV bypasses a small amount of liquid refrigerant to the suction line to maintain a constant load on the compressor. The back pressure regulating valve (BPR) prevents evaporator coil icing and loss of efficiency. The condenser receiver and accumulators further stabilize the system.

*d. Bypass Cycle of Operation.* When the conditioned area temperature falls below the temperature control thermostat setting, a set of contacts closes, energizing the pull-in coil of liquid line solenoid valve K<sub>1</sub> and blocking the flow of liquid refrigerant to the evaporator coil. Suction pressure increases and the back pressure regulating valve (BPR) opens to bypass hot refrigerant gas to the suction line. At the same time, thermal expansion valve BEV meters increased amounts of liquid refrigerant into the suction line to maintain a constant load on the compressor. The condenser receiver and accumulators further stabilize the system.

*e. Heating Operation.* Placing the selector switch in the "LO HEAT" position actuates half of the evaporator heaters mounted in the conditioned air stream, directly behind the evapora-

tor coil. When the selector switch is placed in the "HI HEAT" position, the remaining heaters are energized, providing maximum heating capacity.

#### 5-14. Evaporator Coil

*a. Removal.* Refer to figure 5-2 and remove evaporator coil.

*b. Installation.* Refer to figure 5-2 and install evaporator coil.

#### 5-15. Compressor

*a. Removal.* Refer to figure 5-3 and remove compressor.

**Caution:** If compressor is being replaced because of a motor burnout, flush the system (para 6-19). Failure of the replacement compressor will occur if all of the contaminants are not removed.

*b. Installation.* Refer to figure 5-3 and install compressor.

#### 5-16. Condenser Coil

*a. Removal.* Refer to figure 5-4 and remove condenser coil.

*b. Installation.* Refer to figure 5-4 and install condenser coil by reversing removal procedures.

#### 5-17. Base

*a. Removal.* Refer to figure 5-5 and remove base.

*b. Installation.* Refer to figure 5-5 and install base.

#### 5-18. Casing Assembly

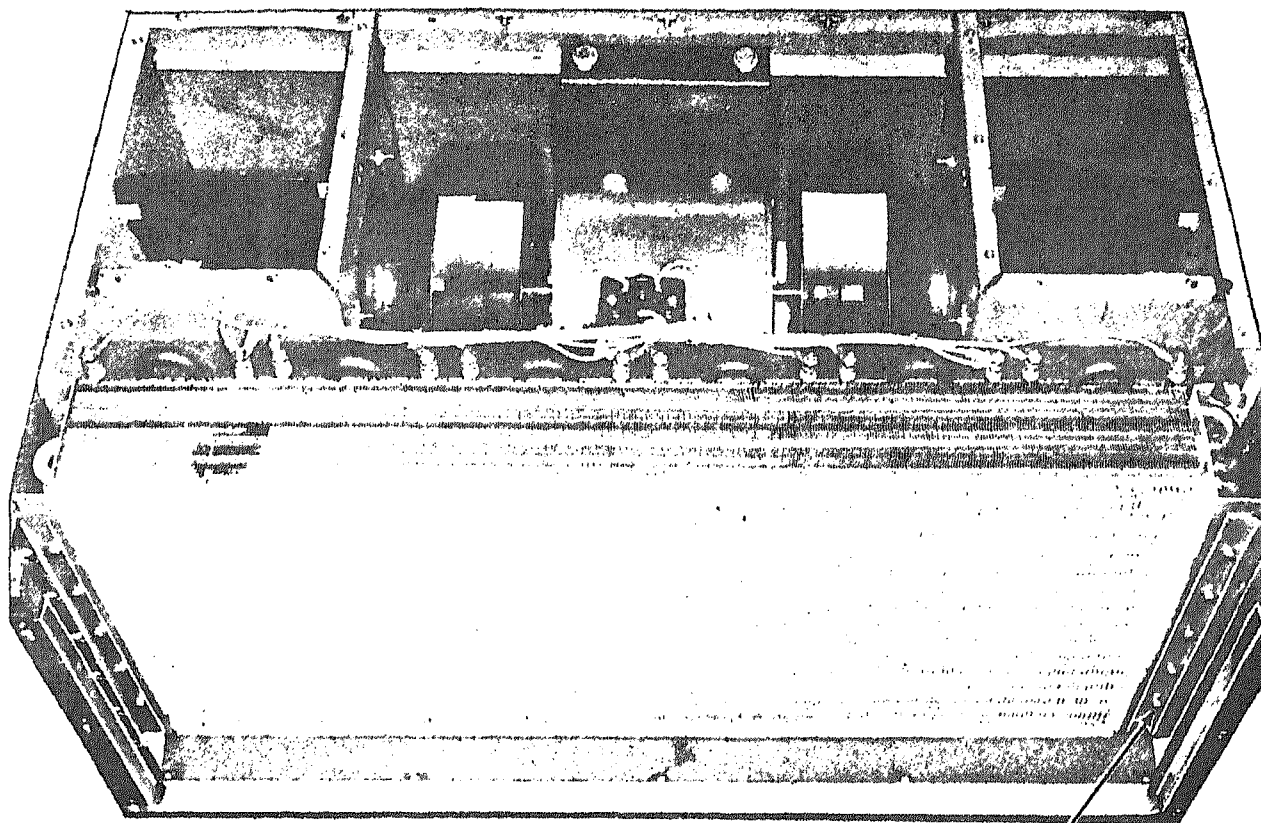
*a. General.* All components and parts of the air conditioner are mounted on or enclosed by the casing. Replacement of the casing assembly requires the removal of all components of the air conditioner that are not part of the casing assembly. In general, groups of parts and assemblies should be removed with as little disassembly as possible for convenience and safety in handling. As replacement of the casing assembly will usually be accomplished in connection with repair and replacement of other parts and assemblies, the exact procedure will vary.

*b. Casing Subassembly.* The casing assembly consists of the welded and riveted casing subassembly and rubber type thermal insulation cemented to the casing inner walls.

(1) To remove insulation from casing subassembly, refer to figure 5-6.

REMOVE TOP PANEL  
ASSEMBLY AND AIR  
DISCHARGE GRILLE  
(PAR. 3-24)

REMOVE MIST ELIMINATOR



NOTE: DISCHARGE REFRIGERANT SYSTEM (PAR. 6-4).  
MELT SOLDER AND DISCONNECT REFRIGERANT  
TUBES AS REQUIRED. AFTER INSTALLATION,  
TEST, EVACUATE, AND RECHARGE REFRIGERANT  
SYSTEM (PAR. 6-17 AND 6-18).

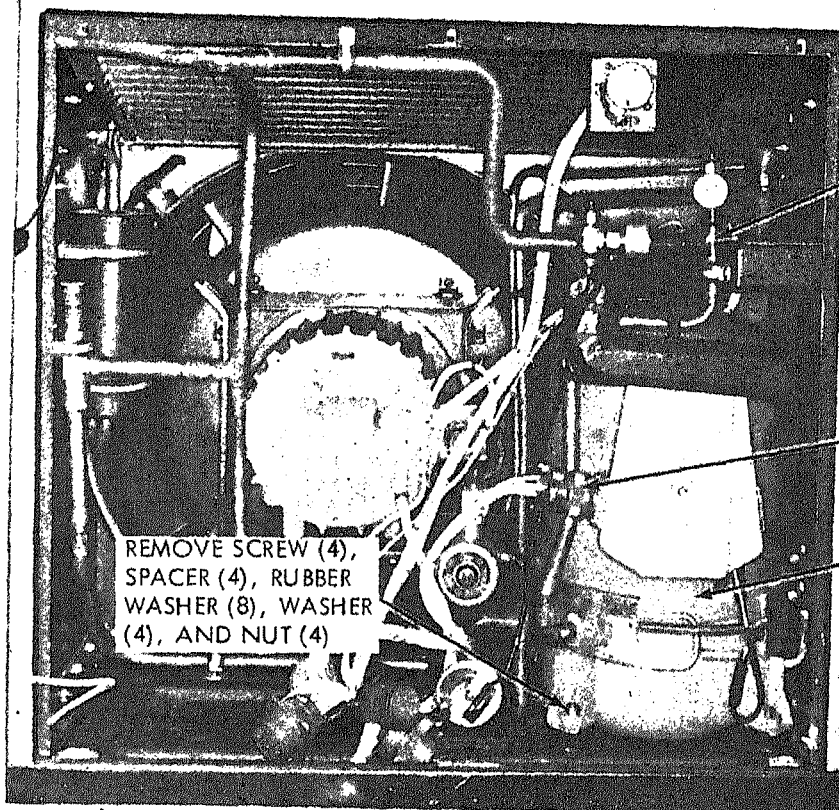
REMOVE SCREW (10)  
WASHER (10) AND LOCK  
WASHER (10)

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*Figure 5-2. Evaporator coil, removal and installation.*

(2) To install insulation, refer to figure 5-6 and cement new pieces of insulation in place as required. Apply adhesive to metal and insula-

tion. Apply adhesive to insulation on side opposite skin side. Allow adhesive to dry until slightly tacky. Press or roll down to avoid trapped air.



NOTE: AFTER INSTALLATION, TEST, EVACUATE AND RECHARGE REFRIGERANT SYSTEM (PAR. 6-17 AND 6-18).

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*Figure 5-3. Compressor, removal and installation.*

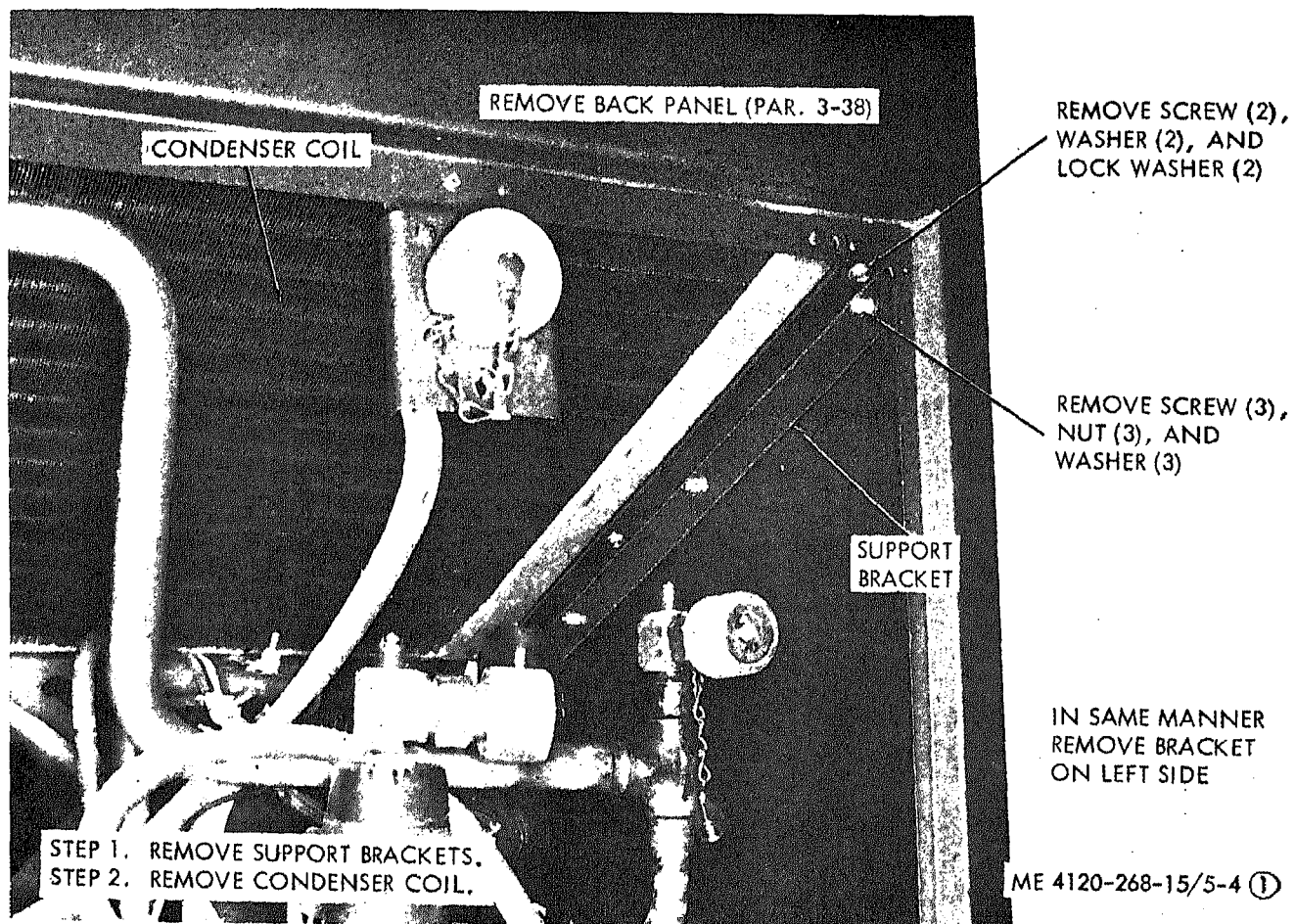


Figure 5-4. Condenser Coil, removal and installation (Sheet 1 of 2).

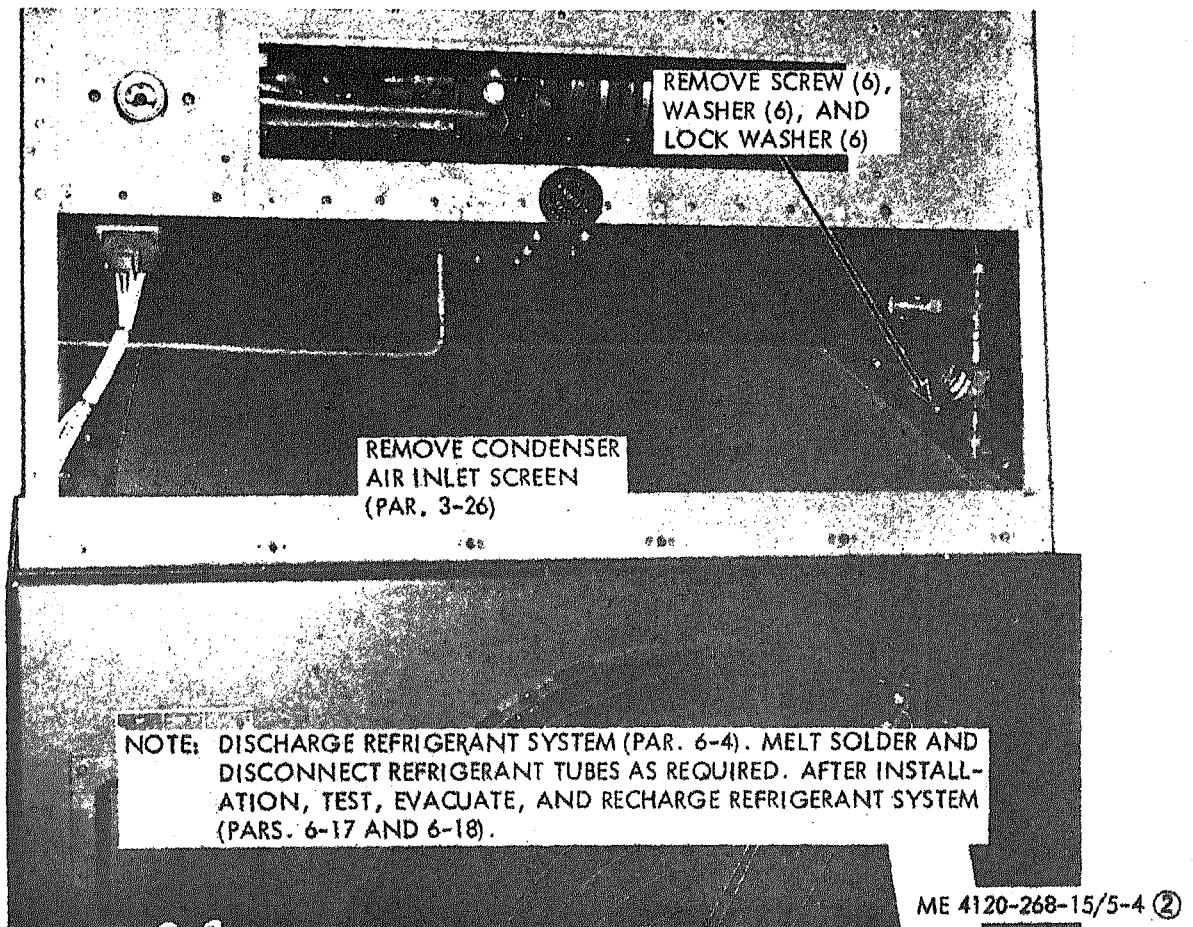


Figure 5-4. Condenser coil removal and installation (Sheet 2 of 2).

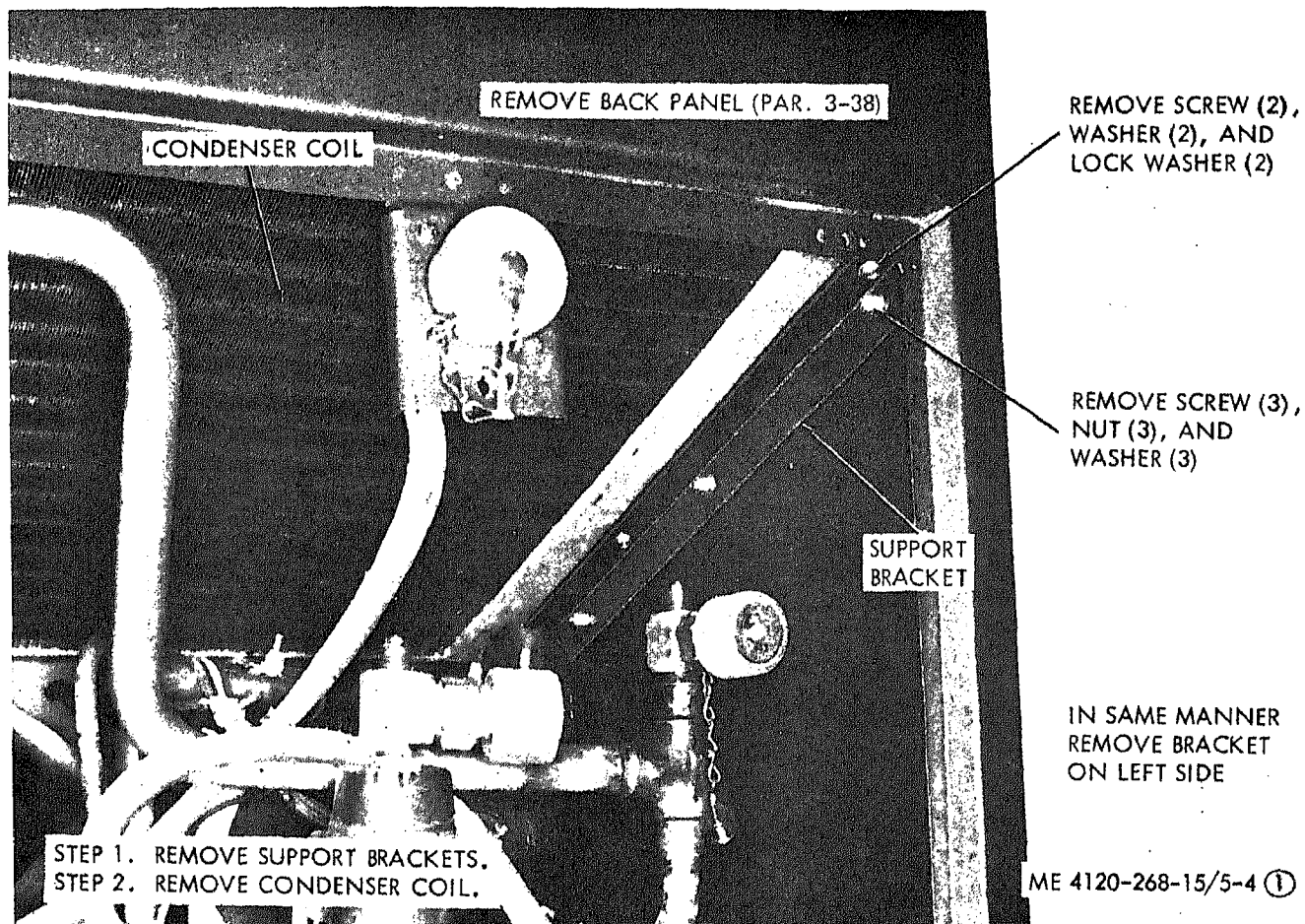


Figure 5-4. Condenser Coil, removal and installation (Sheet 1 of 2).



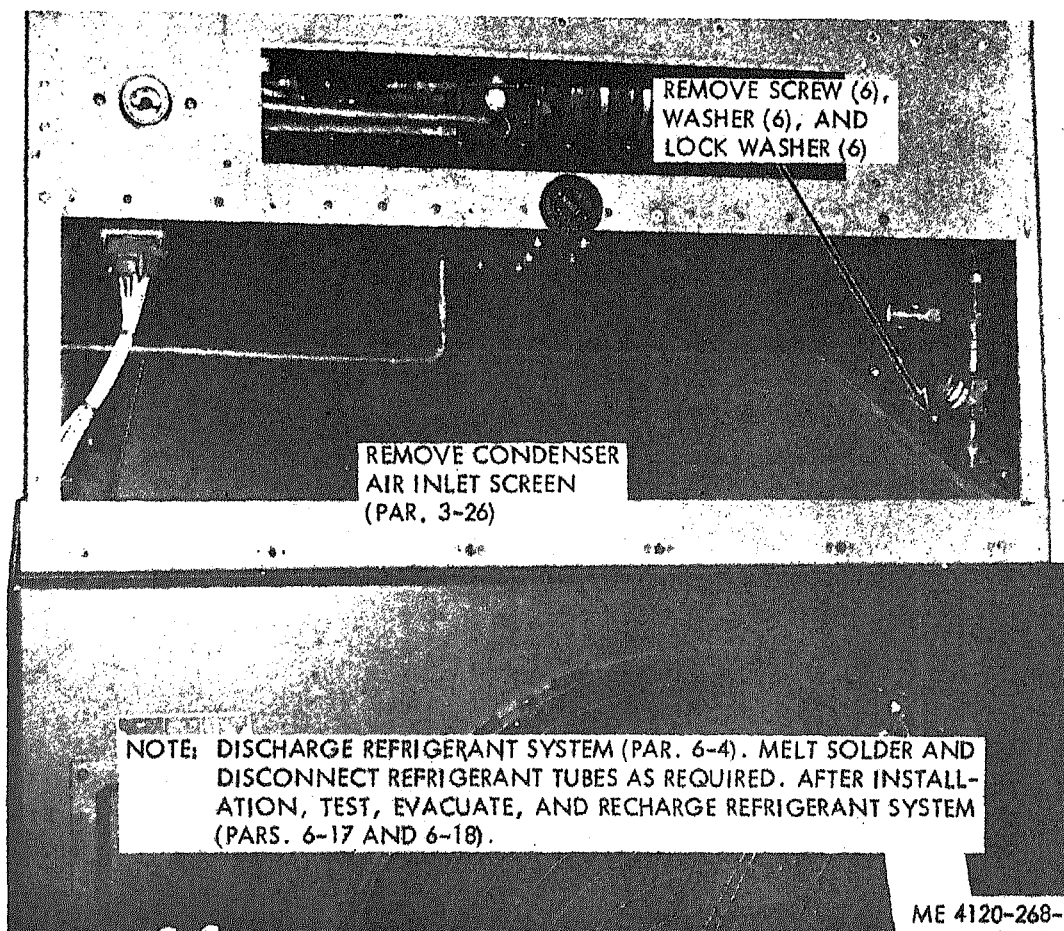
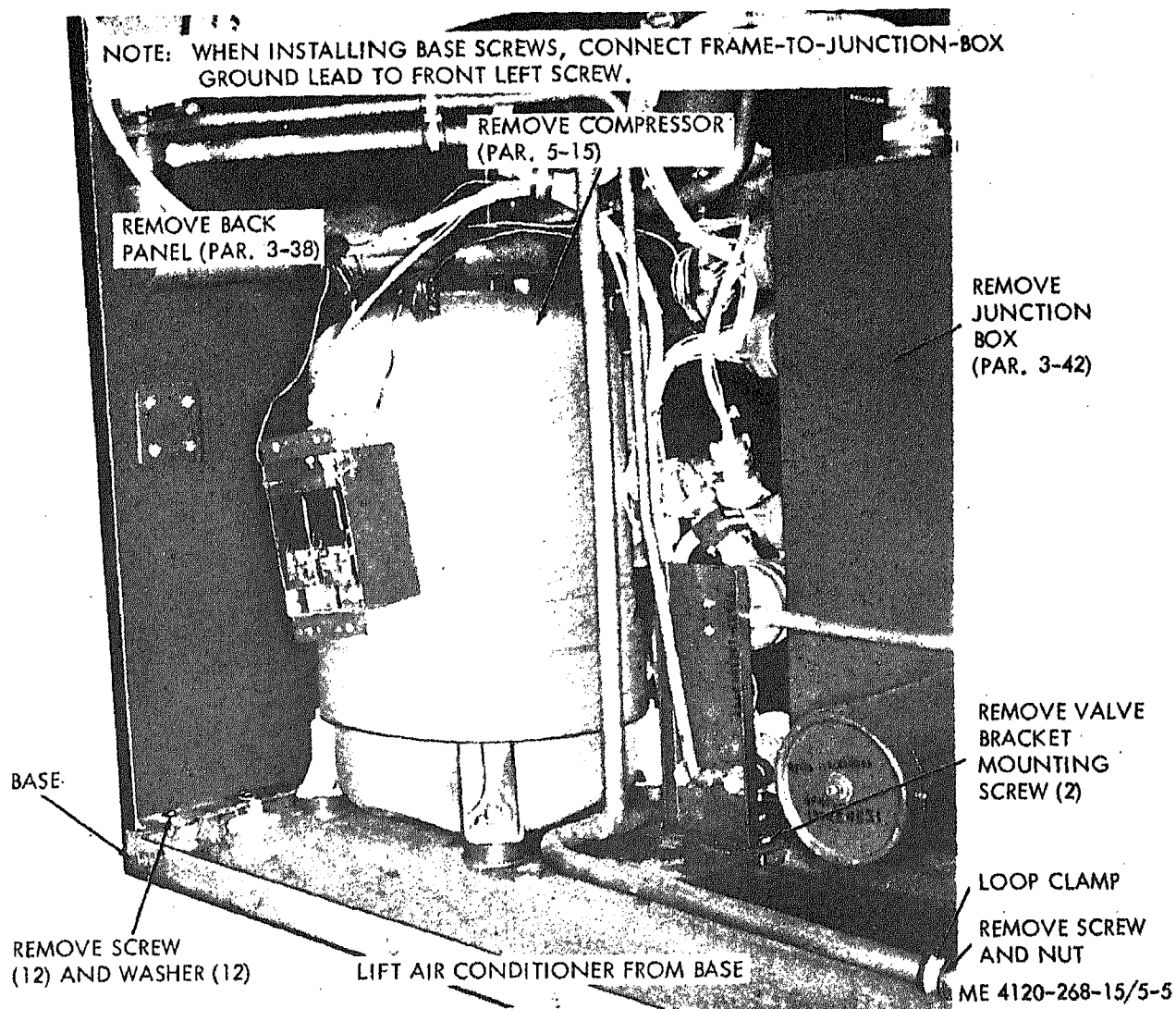
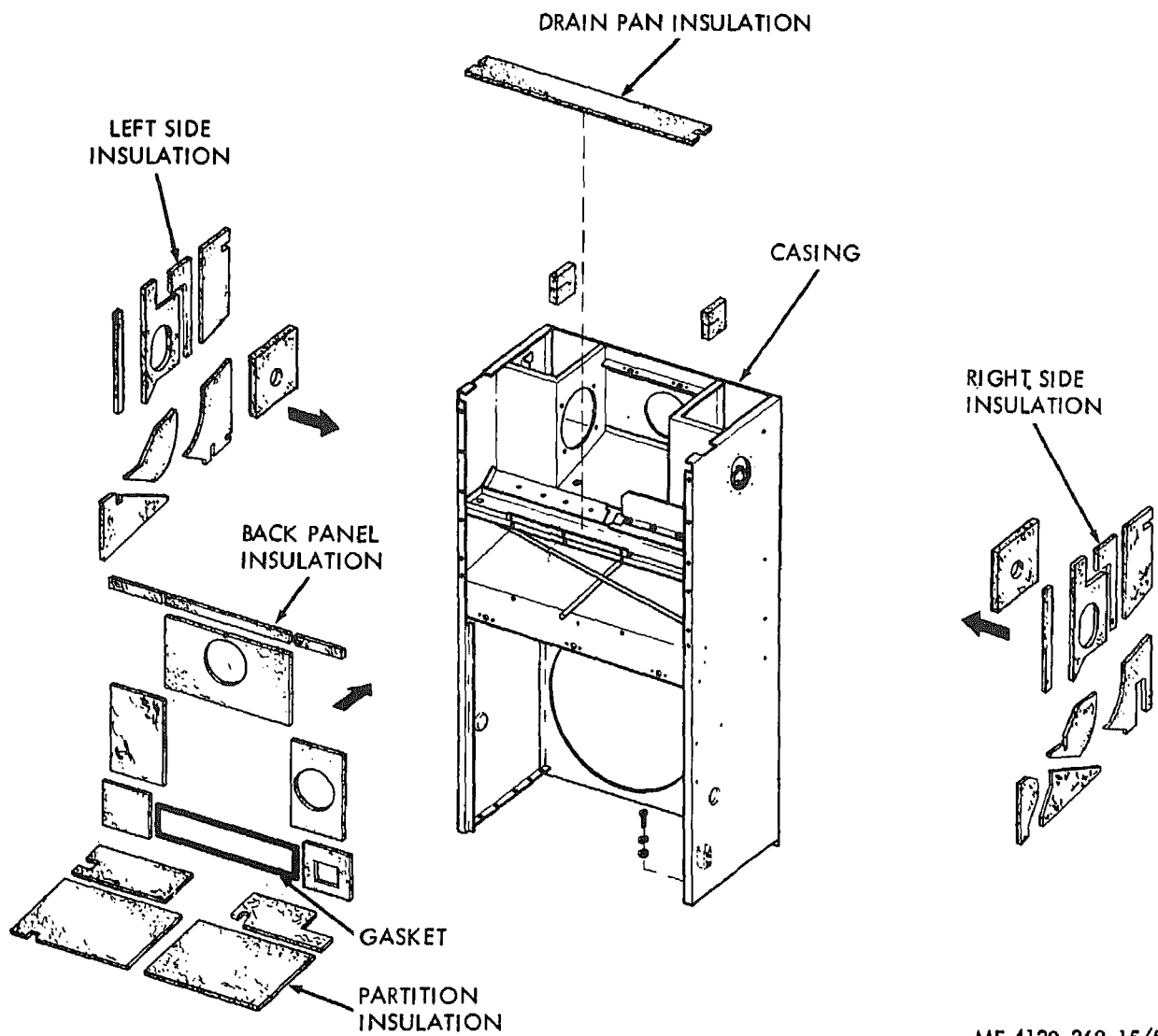


Figure 5-4. Condenser coil removal and installation (Sheet 2 of 2).



*Figure 5-5. Air conditioner base, removal and installation.*





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Figure 5-6. Casing insulation, exploded view.

## CHAPTER 6

### SPECIFIC REPAIR INSTRUCTIONS

#### Section I. REFRIGERANT SYSTEM

##### 6-1. General

This section contains those items which are considered part of the air conditioner refrigerant system. They consist of expansion valves, solenoid valves, pressure sensing valves and switches, compressor assembly, coils and refrigerant tubing. Replacement of the compressor and coils are covered in paragraphs 5-14 through 5-16. This section also includes pressure testing and leak testing instructions. Components of the refrigeration system are handled separately in this section, however, whenever tubing or fittings must be removed or refrigerant joints

unsoldered, the general instructions contained in paragraph 6-4 must be observed.

##### 6-2. Operating Pressure Test

If the air conditioner is losing cooling capacity, or is in some way not functioning properly, a check of refrigerant system operating pressure will frequently lead to cause of malfunction. Install pressure gages on gage ports of suction and discharge line access valves (fig. 6-1) and turn valves two turns to open, exposing gages to system pressure. Start air conditioner and compare gage readings with normal ranges of system pressure listed in table 6-1.

*Table 6-1. Normal Operating Pressures*

OUTDOOR AMBIENT—DEGREES F	50°	75°	100°	125°
90°F DRY-BULB RETURN AIR TO UNIT:				
Suction line (psig)	58—65	58—70	60—75	75—90
Discharge line (psig)	125—160	175—210	255—295	370—410
80°F DRY-BULB RETURN AIR TO UNIT:				
Suction line (psig)	58—65	58—70	60—75	65—75
Discharge line (psig)	120—155	170—205	250—290	370—410

*Note.* Dry-bulb temperatures are measured with an ordinary thermometer.

##### 6-3. Leak-Testing Refrigerant System

*a. Electric or Halide Torch Leak Detector.* The preferred method of testing for leaks in the refrigerant system is by using a halide torch. A halide detector is used by passing the exploring tube over sweat-soldered fittings, all mechanical couplings, and valves. Also test coils, accumulator and receiver with halide detector. If refrigerant is leaking from the system, the flame of the halide torch will change from blue to green when the leak is small. If the leak is large, the flame will be dense blue with a reddish tip; or, a large leak may extinguish the torch. Mark all spots where leaks are detected. Drain the refrigerant system (para 6-4) and repair the leak. Pressure test, evacuate, and recharge system (para 6-17 and 6-18).

**Warning:** Avoid bodily contact with liquid refrigerant and avoid inhaling refrigerant gas. Be especially careful that Refrigerant-22 does not come in contact with the eyes. In case of refrigerant leaks, ventilate the area immediately.

*b. Soap Solution Method.* Operate the air conditioner, brush all possible points of leakage with soap solution, and watch for bubbles. Follow a definite sequence so all points will be thoroughly tested. Wipe the soap solution from all joints and mark any spot where a leak occurs. Drain the refrigerant system (para 6-4) and repair leaks. Pressure test, evacuate, and recharge system (para 6-17 and 6-18).

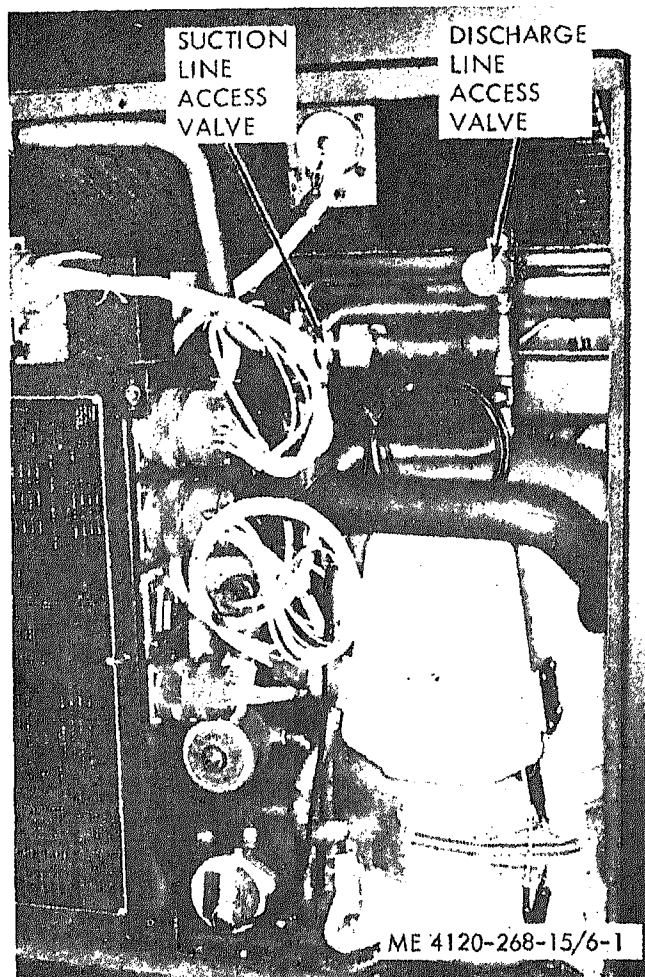


Figure 6-1. System access valves.

#### 6-4. Refrigerant Tubing and Fittings

a. The refrigerant tubes used on the air conditioner consist of copper tubing and the necessary fittings. The joints of the refrigerant tubes are soldered. Inspect the tubing for cracks and breaks. Replace any defective tubing with tubes of the same length, size, shape, and material. Test the installation of tubes and fittings for leaks. Replace rubber insulation as necessary.

*Note.* If the refrigerant system has been open to the atmosphere, replace the dehydrator (para 6-8). Pressure test and evacuate the system before charging (para 6-17 and 6-18).

b. If the refrigerant system must be opened for repairs or replacement of parts, open the suction line access valve and relieve the system pressure. Connect a hose line to the suction line access valve and purge the refrigerant to an outside area.

**Warning:** Avoid bodily contact with liquid Refrigerant-22 and avoid inhaling refrigerant

gas. Be especially careful that Refrigerant-22 does not contact the eyes. In case of refrigerant leaks, ventilate the area immediately.

c. After purging the system allow the tubing to warm to ambient temperature before opening the system; this delay will help prevent the formation of condensation on the inside walls of the tubing. Plug or cap all openings as a part is removed to minimize the entry of dirt and moisture.

d. Use a silver solder on all connections. Silver solder with a 50 percent silver capacity and a melting point of approximately 1160°F is recommended. Continually pass dry nitrogen through the tubing or connections being soldered to prevent formation of harmful copper oxides.

e. When removing and installing the solenoid valves, direct flame away from the valve body to protect it from heat damage. Keep the flame on the outside of the distributor when disassembling or reassembling the expansion valve.

f. No metal to metal contact is allowable on capillary tubes; use tape to prevent such contact.

#### 6-5. Thermal Expansion Valves

a. *General.* A 3.6 ton thermal expansion valve controls the rate of flow of liquid refrigerant into the evaporator coil during the cooling cycle of operation. A 2.1 ton thermal expansion valve functions when the unit is in the bypass cycle of operation. Each expansion valve is provided with a superheat setting or adjustment (10°F for each model) to assure efficiency in the refrigerant system.

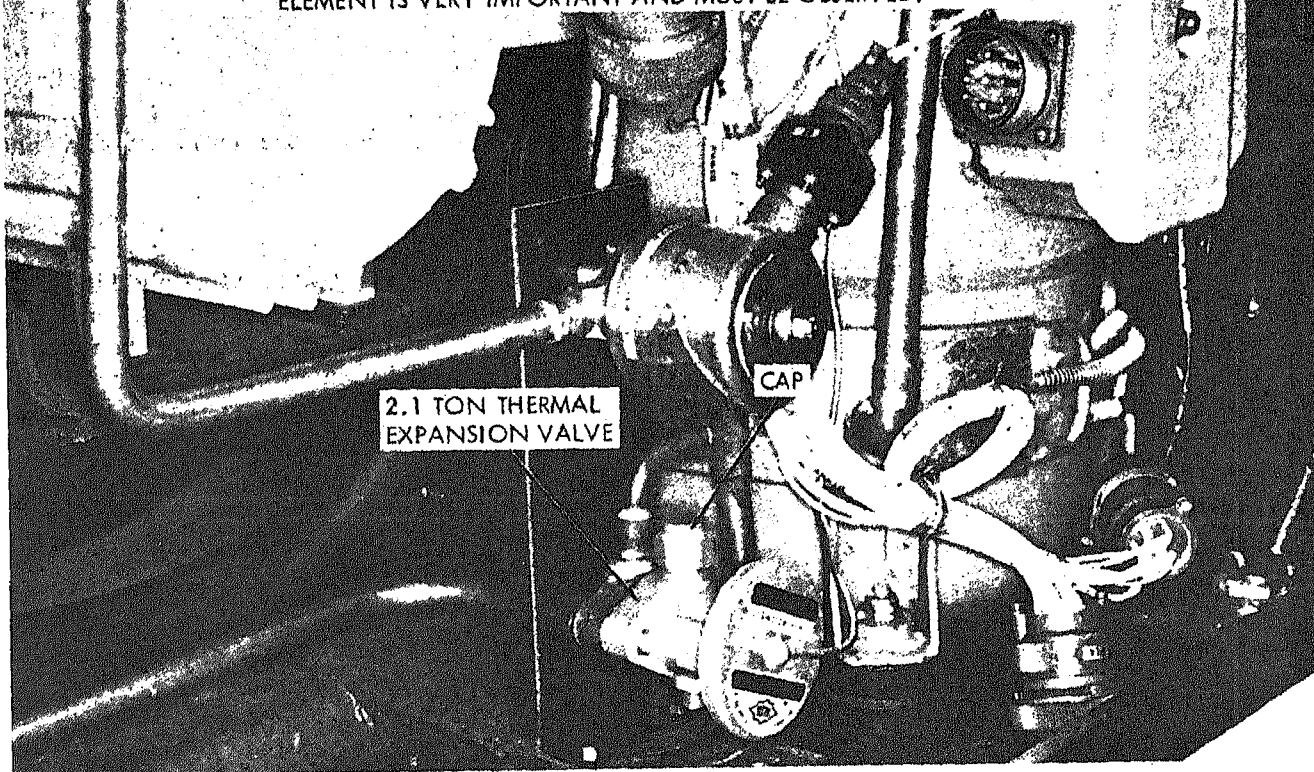
*Note.* A gas is superheated whenever its temperature is higher than the temperature corresponding to its pressure at saturation. Example: Refrigerant-22 at 69 pounds pressure has a temperature of 40°F. If the suction pressure gage reads 69 pounds and the temperature of the suction tube reads 50°F, the gas is superheated 10°F.

b. *Adjustment.* Refer to figures 6-2 and 6-3, and check and adjust the superheat setting of the 2.1 ton thermal expansion valve. The 3.6 ton thermal expansion valve adjusts in the same manner.

c. *Testing.*

(1) Stop the air conditioner and allow the suction line to warm up to ambient temperature. Remove the sensing bulb from its location against the suction line and place in an ice-water bath (32°F).

**CAUTION:** NEVER ADJUST THE EXPANSION VALVES UNLESS IT IS ABSOLUTELY NECESSARY. WHEN ADJUSTING THE EXPANSION VALVES ALLOW AT LEAST 20 MINUTES BETWEEN EACH ADJUSTMENT. THIS TIME ELEMENT IS VERY IMPORTANT AND MUST BE OBSERVED.



**NOTE:** REMOVE AIR INTAKE GRILLE AND FILTER (PAR. 3-25) AND FOLLOW SAME PROCEDURE TO ADJUST 3.6 TON THERMAL EXPANSION VALVE.

**ADJUSTMENT:**

- STEP 1. TAPE THE BULB OF A THERMOMETER TO SUCTION LINE NEAR SENSING ELEMENT. INSULATE THERMOMETER BULB.
- STEP 2. INSTALL A SUITABLE PRESSURE GAGE AT SUCTION LINE ACCESS VALVE (PAR. 6-2).
- STEP 3. OPERATE THE UNIT ON "COOL" FOR APPROXIMATELY 30 MINUTES (THERMOMETER READING MUST STABILIZE).
- STEP 4. CHECK THERMOMETER AND PRESSURE GAGE READINGS. COMPARE READINGS WITH FIGURE 6-3. THERMOMETER READING SHOULD BE APPROXIMATELY 10°F HIGHER THAN TEMPERATURE GIVEN ON FIGURE.
- STEP 5. REMOVE CAP, LOOSEN NUT AND TURN ADJUSTING SCREW ONE TURN CLOCKWISE TO INCREASE SUPERHEAT 4°F, OR ONE TURN COUNTERCLOCKWISE TO DECREASE SUPERHEAT. INSTALL CAP.

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*Figure 6-2. Thermal expansion valve superheat adjustment.*

(2) Start the air conditioner, remove the sensing bulb from the ice-water bath and warm by hand while feeling the suction line. If the suction line temperature drops, the valve is operating correctly. Stop air conditioner and reinstall the sensing bulb.

(3) If there is little or no change in suction line temperature, the valve is defective and must be replaced.

**Caution:** Do not warm sensing bulb in hand longer than necessary to check operation of the valve. The valve is wide open or nearly so

during this procedure and excessive flood-back of liquid refrigerant into the suction line will damage the compressor.

*d. Removal.* Discharge the refrigerant system (para 6-4) refer to figures 6-4 and 6-5, and remove the thermal expansion valves.

*e. Installation.* Replace defective expansion valves and install in reverse order of removal as illustrated in figures 6-4 and 6-5. Test, evacuate and recharge the unit refrigerating system (para 6-17 and 6-18).

### 6-6. Pressure Equalizer Solenoid Valve

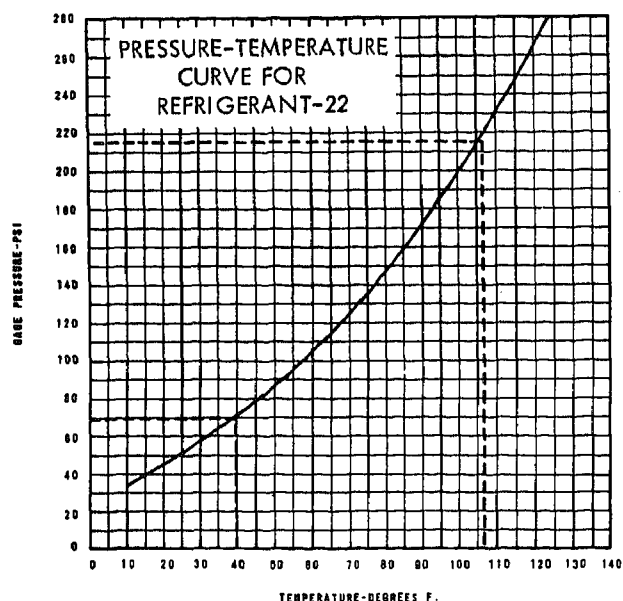
*a. Removal.* Discharge refrigerant system (para 6-4), refer to figure 6-6 and remove the solenoid valve.

*b. Installation.* Install solenoid valve in reverse order of removal as illustrated on figure 6-6. Test, evacuate, and recharge the refrigerant system (para 6-17 and 6-18).

### 6-7. Liquid Line Solenoid Valve

*a. Removal.* Discharge refrigerant system (para 6-4), refer to figure 6-7 and remove the liquid line solenoid valve.

*b. Installation.* Install solenoid valve in reverse order of removal as illustrated on figure 6-7. Test, evacuate, and recharge the refrigerant system (para 6-17 and 6-18).



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### 6-8. Dehydrator

*a. General.* The dehydrator is a filter and drier for the refrigerant system. The dehydrator is to be replaced whenever the refrigerant system is opened for repair.

*b. Removal.* Discharge the refrigerant system (para 6-4). Remove dehydrator (fig. 6-7).

*c. Installation.* Install dehydrator (fig. 6-7). Test, evacuate, and charge system (para 6-17 and 6-18).

### 6-9. Liquid Sight Indicator

*a. General.* The liquid sight indicator indicates dryness of refrigerant and also indicates whether the system is fully charged or undercharged.

*b. Removal.* Discharge refrigerant system (para 6-4). Refer to figure 6-8 and remove the liquid sight indicator.

*c. Installation.* Refer to figure 6-8 and install the liquid sight indicator. Test, evacuate, and charge the system (para 6-17 and 6-18).

### 6-10. Back Pressure Regulating Valve

*a. General.* The back pressure regulating valve figure 6-9 regulates refrigerant pressure in the evaporator to prevent coil freeze up. The back pressure regulating valve also bypasses refrigerant gas from the discharge line to the suction line during bypass operation with the selector switch on "COOL". Valve is preset to establish a minimum of 57.8 psig in the evaporator.

*b. Adjusting.* Adjust the back pressure regulating valve, remove the button plug (fig. 6-9) at the top of the valve and turn the adjusting stem. Turning the stem clockwise increases (raises) the valve setting. Check system operating pressures (para 6-2).

*c. Removal.* Discharge the refrigerant (para 6-4). Refer to figure 6-9, and remove the back pressure regulator valve.

*d. Installation.* replace a defective back pressure regulating valve and install in reversing order of removal as illustrated on figure 6-9. Test, evacuate and recharge refrigerant system (para 6-17 and 6-18).

### 6-11. High and Low Pressure Cutout Switches

*a. General.* The high pressure cutout switch prevents the compressor from operating if the head pressure exceeds 445 psig (pounds per square inch gage). The low pressure cutout

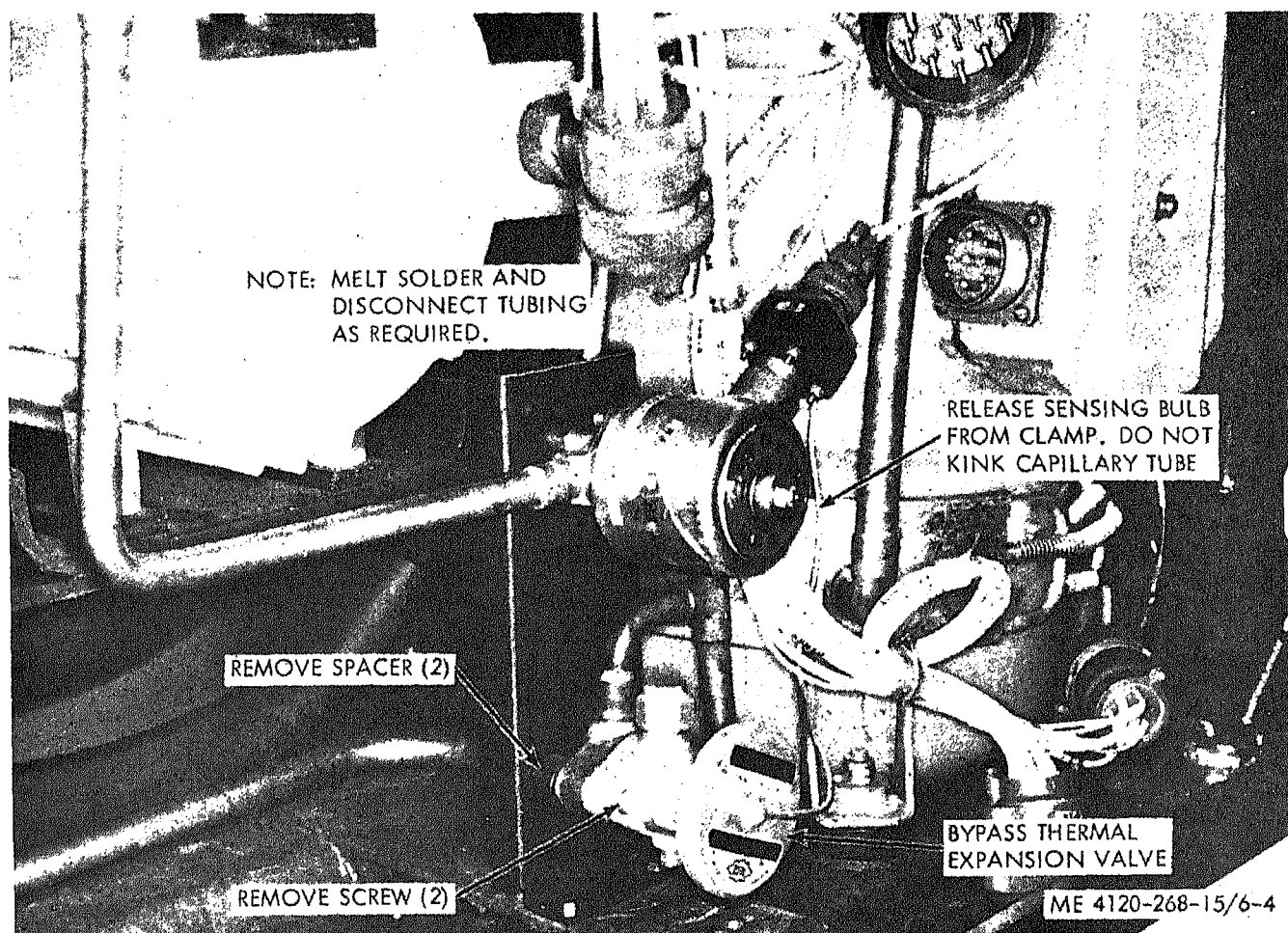


Figure 6-4. Bypass thermal expansion valve, removal and installation.

b. *Removal.* Discharge the refrigerant system (para 6-4) and remove pressure switch assembly as illustrated in figure 6-10.

c. *Disassembly.* Refer to figure 6-10 and disassemble pressure switch assembly.

d. *Assembly.* Refer to figure 6-10 and assemble pressure switch assembly.

e. *Installation.* Install pressure switch assembly in reverse order of removal as illustrated in figure 6-10. Test, evacuate and recharge the unit refrigerant system (para 6-17 and 6-18).

## 6-12. Pressure Relief Valve and Check Valve

a. *General.* The pressure relief valve (fig. 6-11) is located in a tee just above the condenser coil. The pressure relief valve protects the refrigerant system from excessive pressure. It is preset to open at a minimum pressure of 540 psig and is not adjustable. The check valve (fig. 6-10) is located between the pressure relief valve tee and condenser coil. The check valve

prevents refrigerant in the accumulator from returning to the condenser coil.

b. *Removal.* Discharge the refrigerant system (para 6-4), refer to figure 6-11 and remove valves. Melt solder to remove check valve.

c. *Installation.* Install pressure relief valve and check valve by reversing order of removal as illustrated on figure 6-11. Pressure test, evacuate and recharge refrigerating system (para 6-17 and 6-18).

## 6-13. System Access Valves

a. *General.* Two diaphragm-type valves (suction line and discharge line) provide access to the refrigerant system.

b. *Removal.* Discharge the refrigerant system (para 6-4). Using a parallel jaw wrench, remove access valves (fig. 6-1).

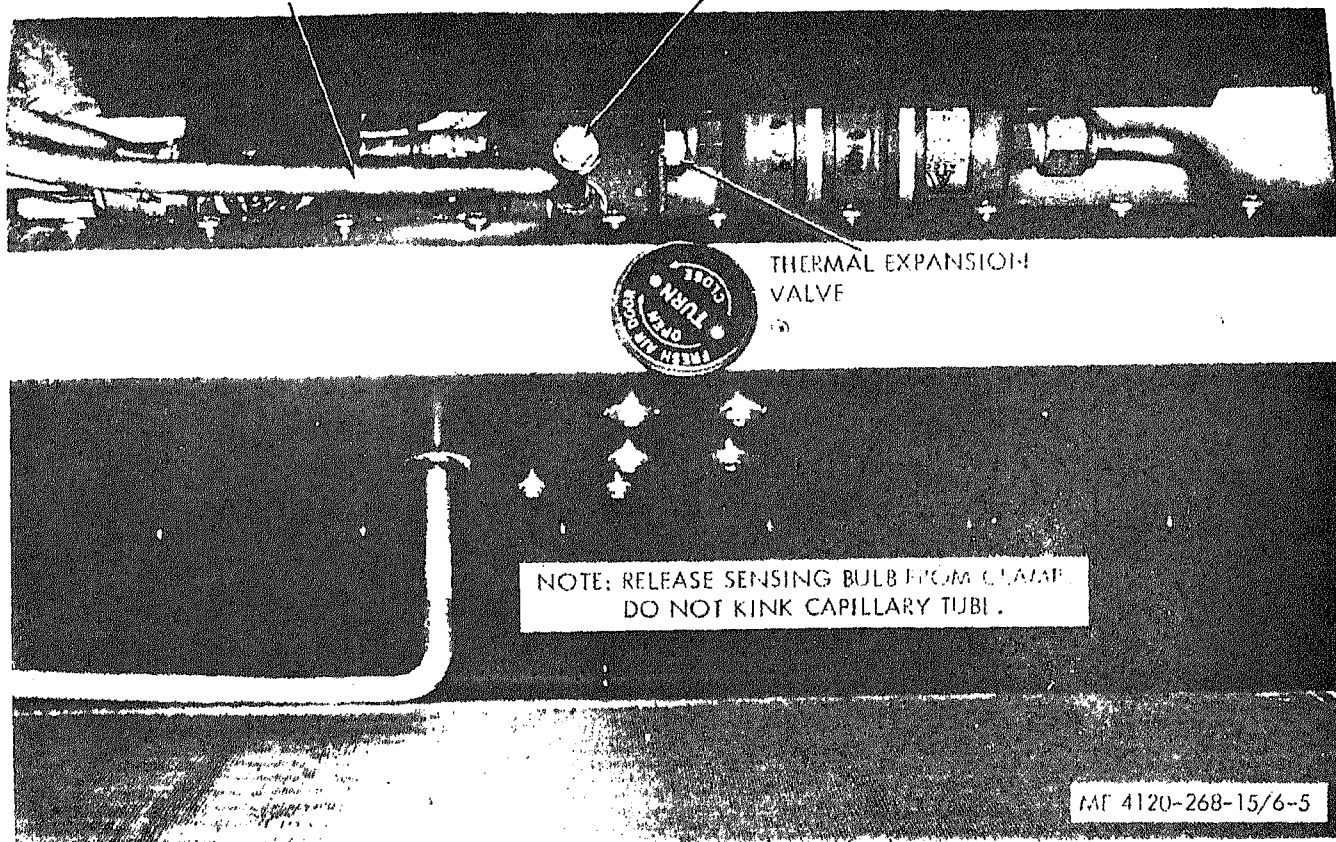
c. *Inspection.* Inspect valves for damage, cracks and stripped threads. Replace valve if defective.



REMOVE AIR CONDITIONING FILTER (PAR. 3-25)  
REMOVE FRESH AIR FILTER (PAR. 3-26)

MELT SOLDER AND DISCONNECT  
TUBING AS REQUIRED.

REMOVE SCREW (2)  
AND SPACER (2)



*Figure 6-5. Thermal expansion valve, removal and installation.*

*d. Installation.* Replace a defective valve and install valves in reverse order of removal as illustrated on figure 6-1. Test, evacuate, and recharge the unit refrigeration system (para 6-17 and 6-18).

#### **6-14. Receiver**

*a. Removal.* Discharge the refrigerant system (para 6-4). Refer to figure 6-12 and remove receiver.

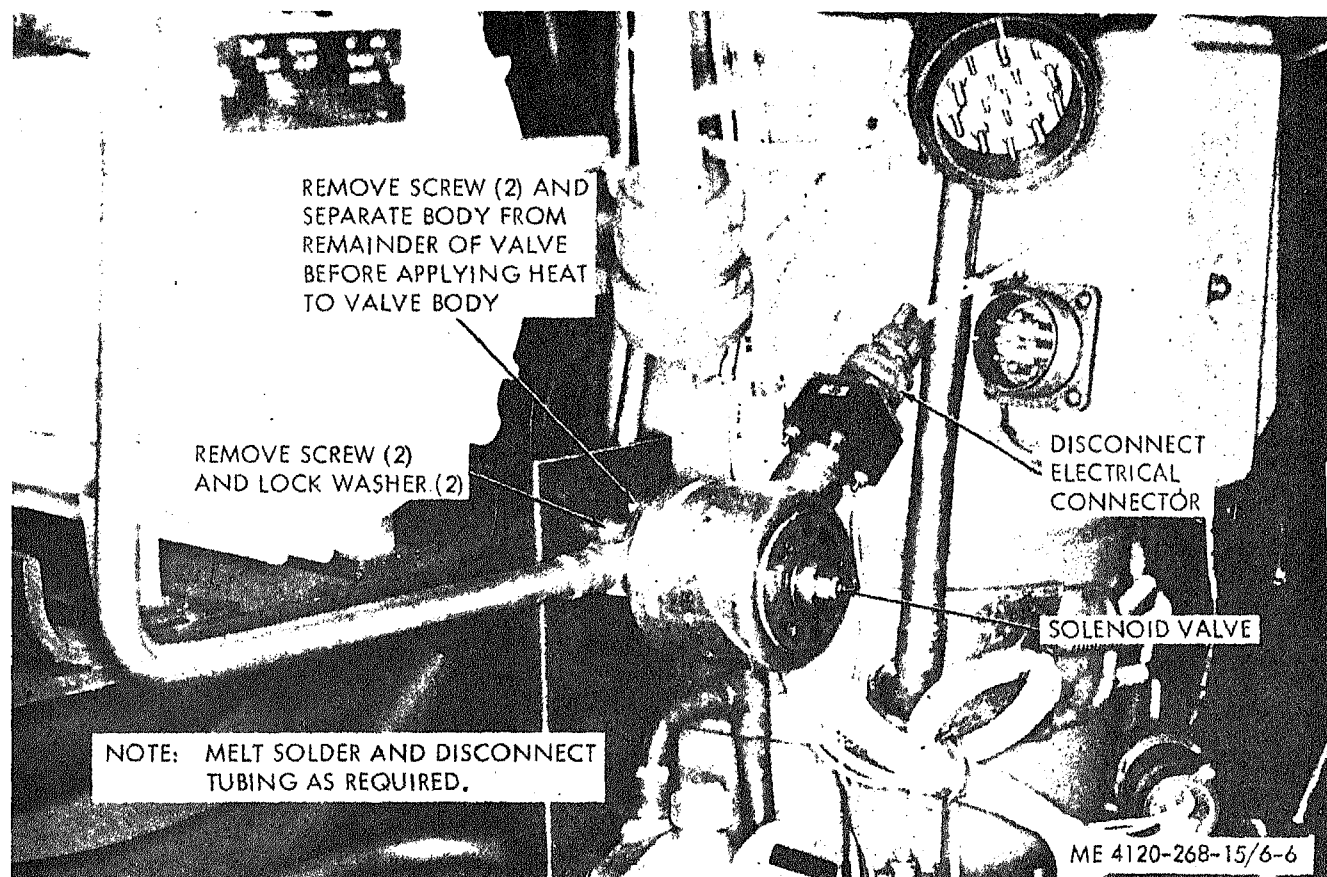
*b. Installation.* Refer to figure 6-12 and install receiver in reverse order of removal. Test,

evacuate, and recharge the refrigeration system (para 6-17 and 6-18).

#### **6-15. Accumulator**

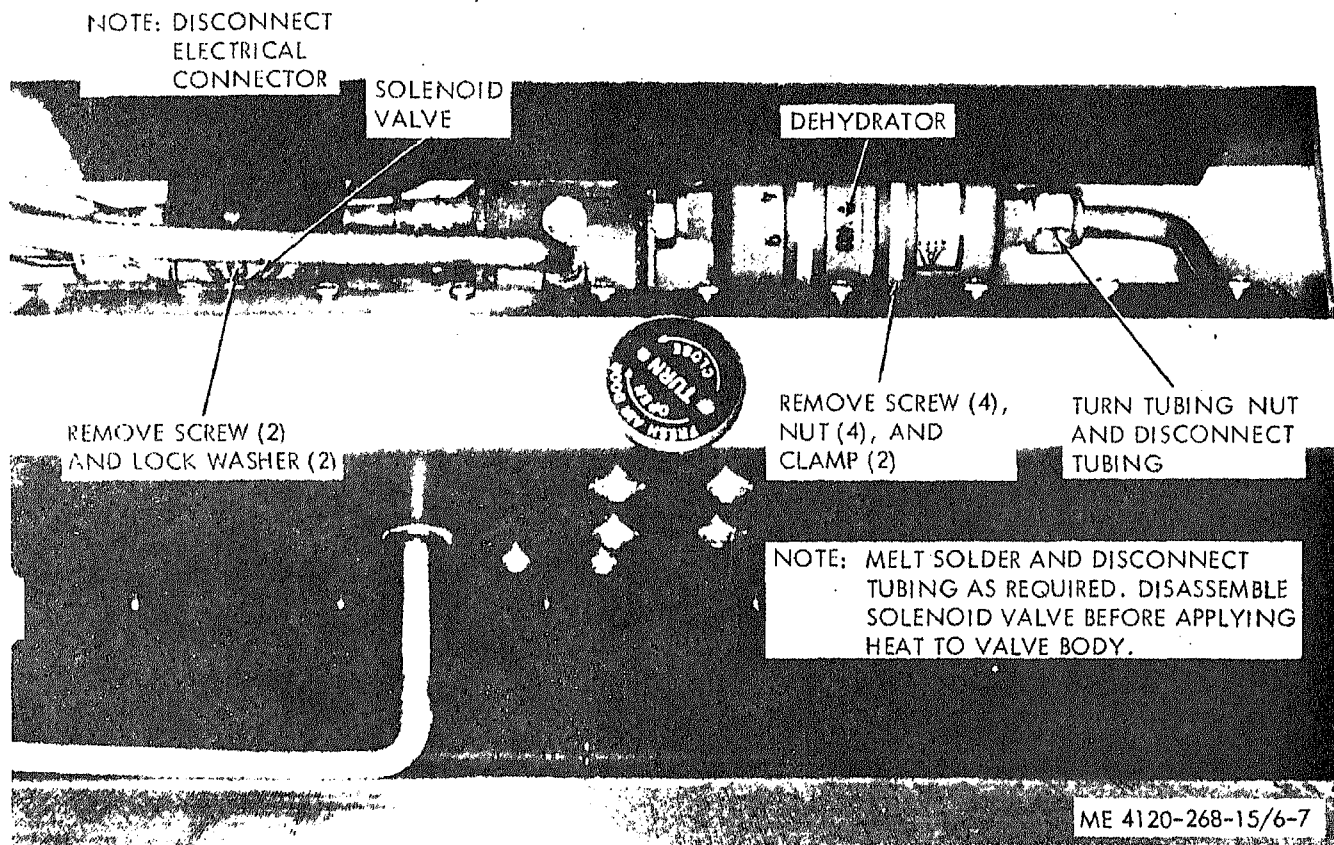
*a. Removal.* Discharge the refrigerant system (para 6-4). Refer to figure 6-13 and remove accumulator.

*b. Installation.* Refer to figure 6-13 and install accumulator in reverse order of removal. Test, evacuate, and recharge the refrigeration system (para 6-17 and 6-18).



*Figure 6-6. Pressure equalizer solenoid valve, removal and installation.*





*Figure 6-7. Solenoid valve and dehydrator, removal and installation.*

NOTE: MELT SOLDER AND DISCONNECT TUBING AS REQUIRED

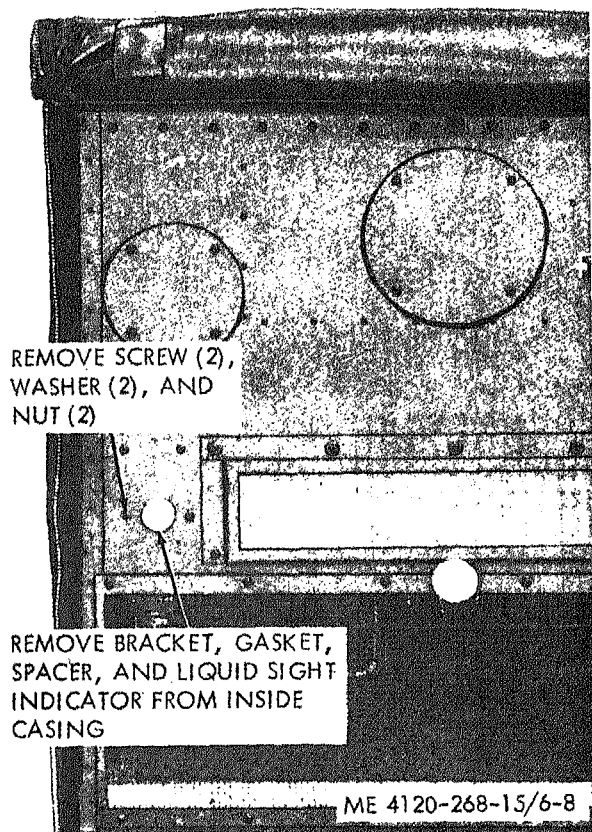


Figure 6-8. Liquid sight indicator, removal and installation.

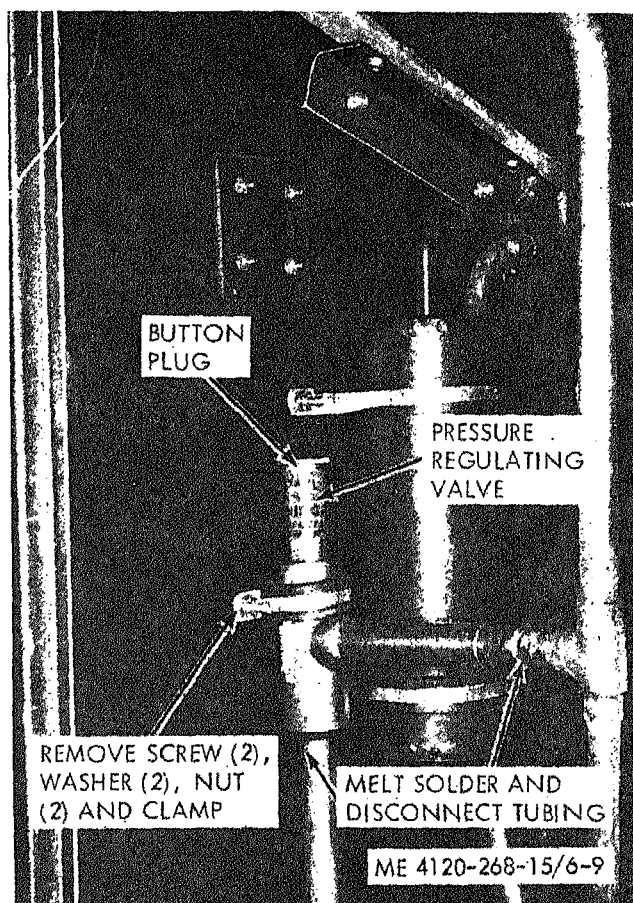


Figure 6-9. Pressure regulating valve, removal and installation.

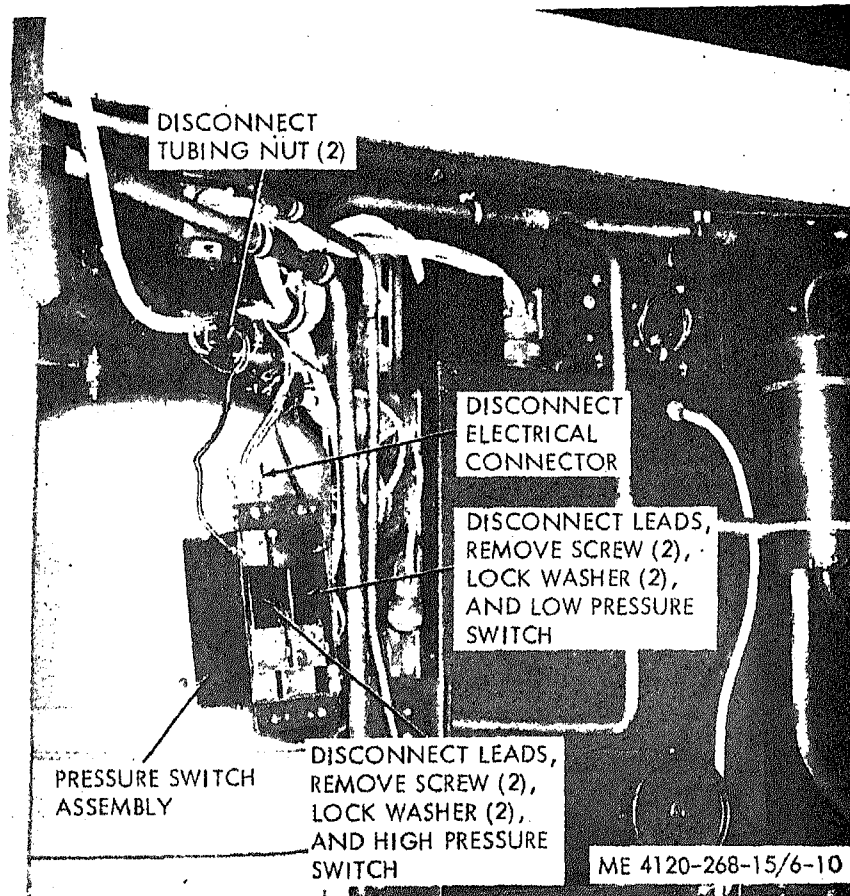
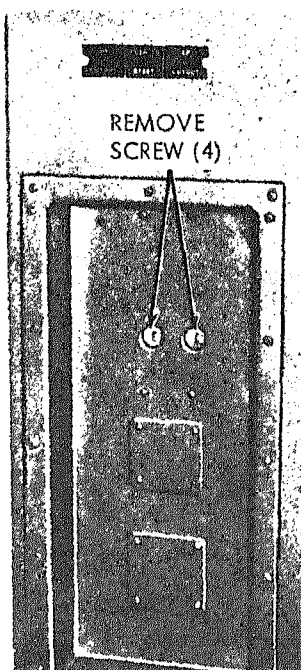


Figure 6-10. High and low pressure switches, removal and installation.

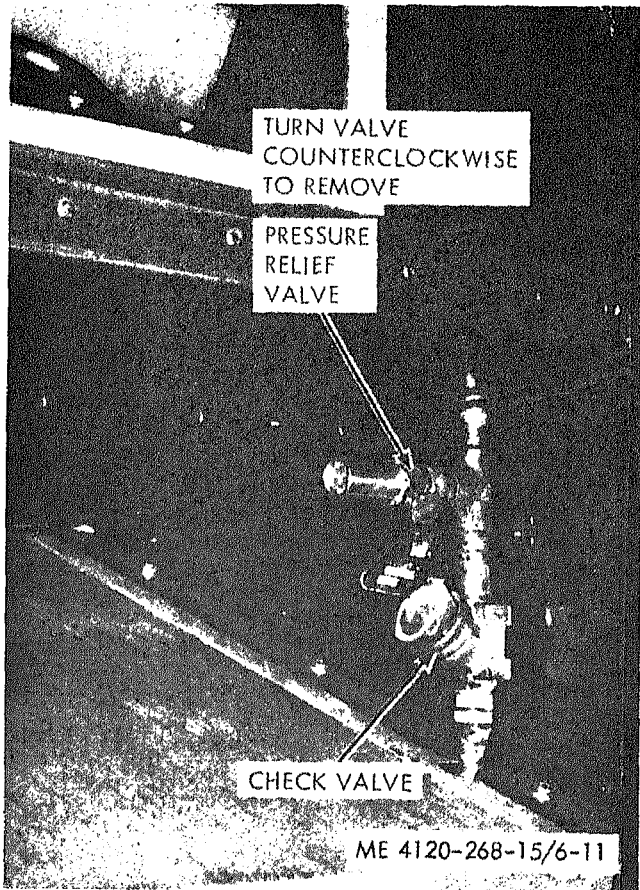


Figure 6-11. Pressure relief valve, removal and installation.

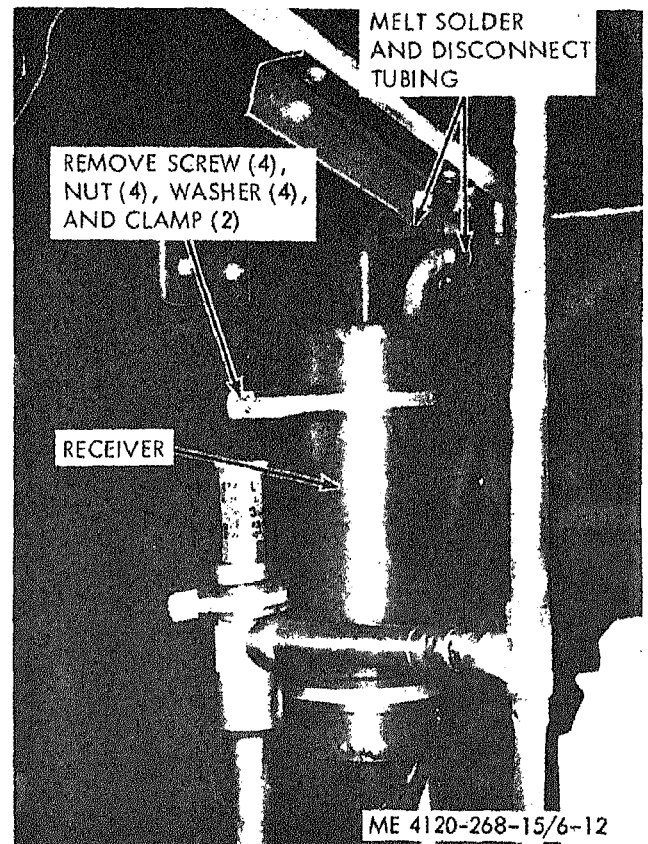
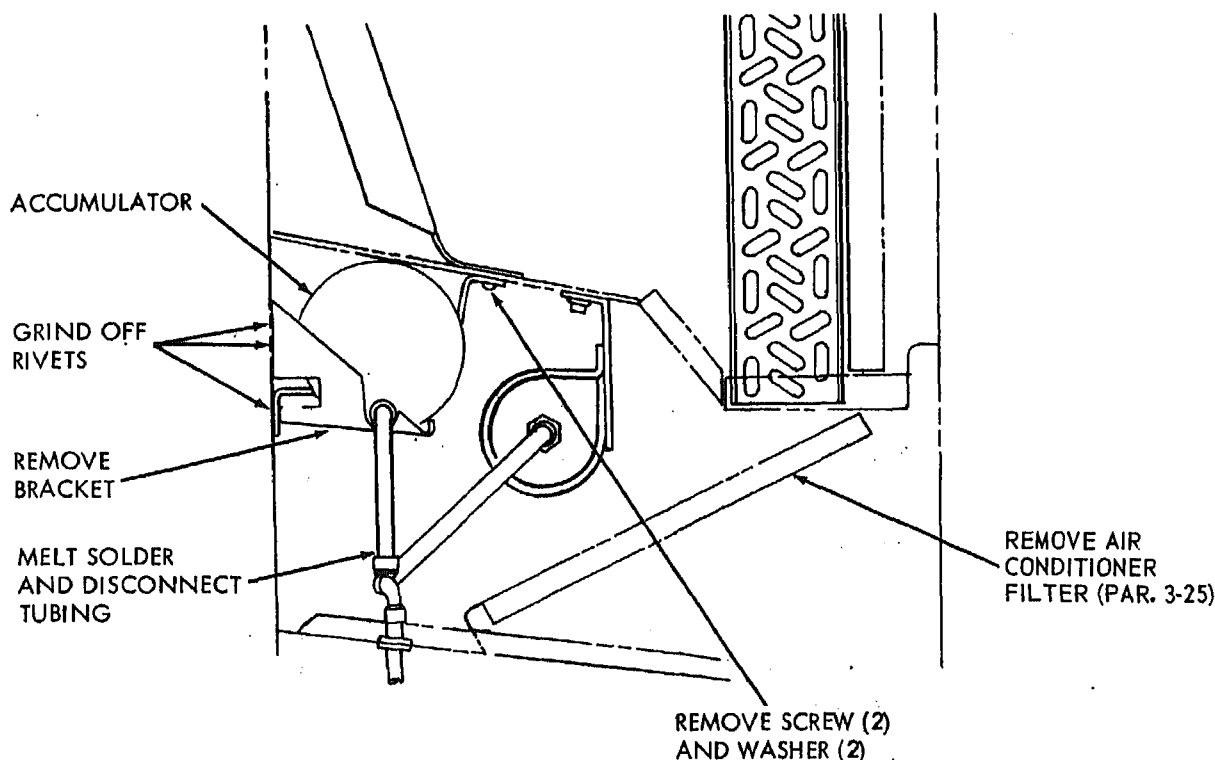


Figure 6-12. Receiver, removal and installation.



ME 4120-268-15/6-13

Figure 6-18. Accumulator, removal and installation

## Section II. DISCHARGING, PRESSURE TESTING, EVACUATING AND RECHARGING THE REFRIGERANT SYSTEM

### 6-16. Discharging the Refrigerant System

Attach a suitable hose to the suction line service valve (fig. 6-1) and discharge the refrigerant into a safe area.

**Warning:** Avoid bodily contact with liquid refrigerant and avoid inhaling refrigerant gas. Be especially careful that Refrigerant-22 does not come in contact with the eyes. In case of refrigerant leaks, ventilate the area immediately.

### 6-17. Pressure Testing and Evacuating the Refrigerant System

After repairs have been made, the system is to be tested for leaks and weak connections. Refer to figure 6-14, and pressure test and evacuate the refrigerant system.

### 6-18. Charging the Refrigerant System

Refer to figure 6-15 and 6-16; charge the refrigerant system.

### 6-19. Flushing the System

*a. General.* A compressor motor burnout may cause high temperatures to develop in the compressor causing a breakdown of the oil and refrigerant, resulting in formation of acid, moisture, and sludge. All these are extremely corrosive and must be flushed from the system. Repeated burnouts will occur if all of the contaminants are not removed.

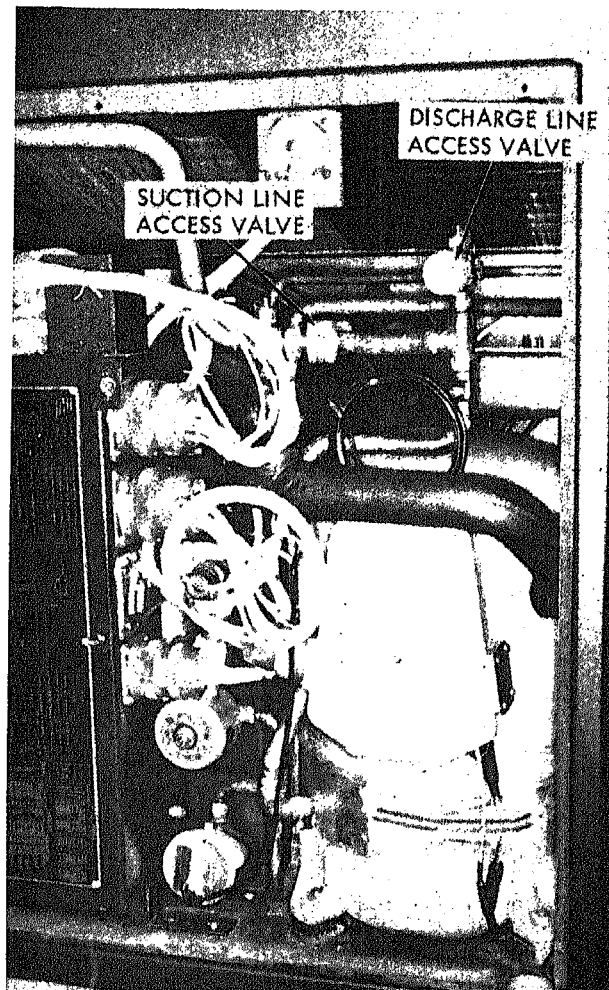
*b. Flushing the System.* After compressor motor burnout, flush the system as described below:

(1) Refrigerant-11, along with a small amount of dry nitrogen to force the refrigerant through the tubing, is recommended for flushing the system.

(2) Remove the dehydrator as described in paragraph 6-8.

(3) Flush the refrigerant tubing to remove all contaminants.

(4) The solenoid valves are normally open when de-energized. These valves must be open to

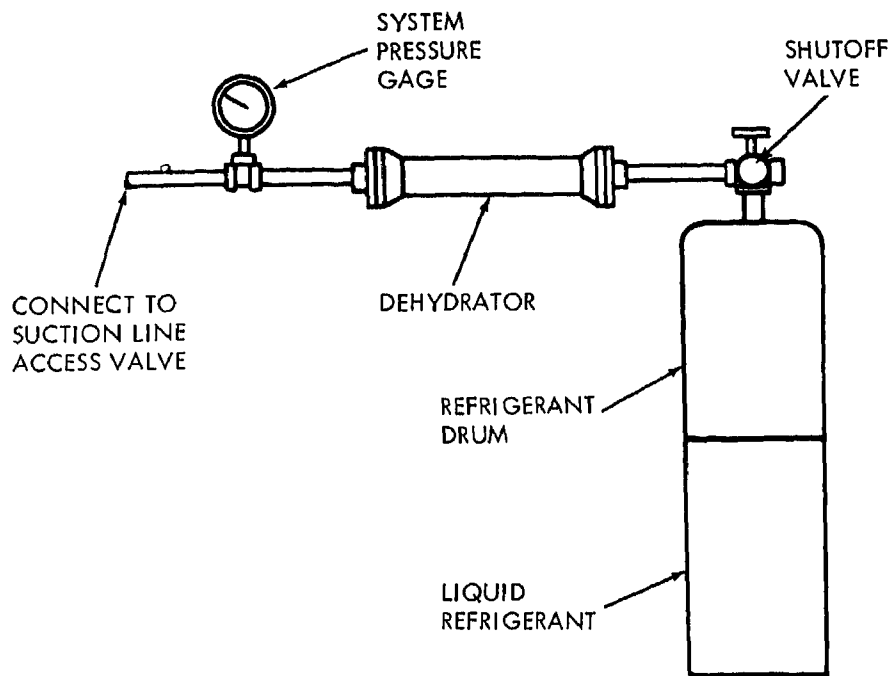


**WARNING:** AVOID BODILY CONTACT WITH LIQUID REFRIGERANT AND AVOID INHALING REFRIGERANT GAS. BE ESPECIALLY CAREFUL THAT REFRIGERANT-22 DOES NOT CONTACT EYES. IN CASE OF REFRIGERANT LEAKS, VENTILATE THE AREA IMMEDIATELY.

- STEP 1.** CLOSE ACCESS VALVES HAND-TIGHT. REMOVE CAP FROM SUCTION LINE ACCESS VALVE. INSTALL PRESSURE GAGE ON DISCHARGE LINE ACCESS VALVE AND OPEN VALVE.
- STEP 2.** CONNECT HOSE FROM REFRIGERANT CHARGING HOOKUP LOOSELY TO SUCTION LINE ACCESS VALVE. OPEN REFRIGERANT DRUM SHUTOFF VALVE SLIGHTLY TO PURGE HOSE. TIGHTEN CONNECTION AT ACCESS VALVE. OPEN DRUM SHUTOFF VALVE AND OPEN SUCTION LINE ACCESS VALVE.

ME 4120-268-15/6-14 (1)

Figure 6-14. Pressure testing and evacuating refrigerant system (Sheet 1 of 3).



NOTE: REFRIGERANT DRUM MUST BE IN UPRIGHT POSITION TO ALLOW ONLY GASEOUS REFRIGERANT TO ENTER SYSTEM.

STEP 3. CLOSE THE DRUM SHUTOFF VALVE WHEN THE DISCHARGE LINE PRESSURE GAGE REACHES 10 PSIG. CLOSE SUCTION LINE ACCESS VALVE AND DISCONNECT CHARGING HOSE FROM VALVE.

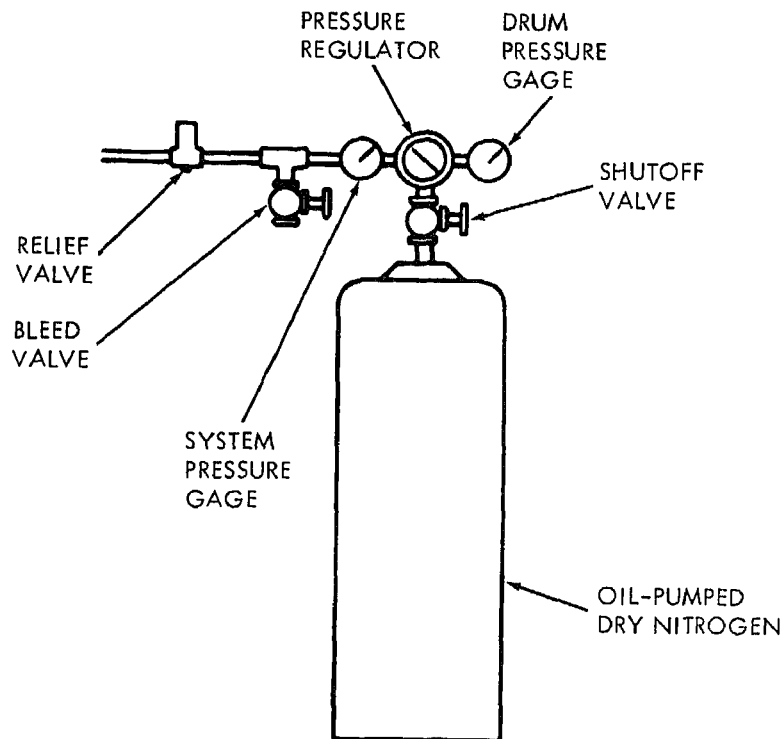
STEP 4. CONNECT HOSE FROM PRESSURE TESTING HOOKUP LOOSELY TO SUCTION LINE ACCESS VALVE. OPEN NITROGEN DRUM SHUTOFF VALVE SLIGHTLY TO PURGE HOSE. TIGHTEN CONNECTION AT SUCTION LINE ACCESS VALVE. OPEN SHUTOFF VALVE AND SUCTION LINE ACCESS VALVE. BUILD UP SYSTEM PRESSURE UNTIL DISCHARGE LINE PRESSURE REACHES 150 PSIG. CLOSE SUCTION LINE ACCESS VALVE AND SHUTOFF VALVE. DISCONNECT CHARGING HOSE FROM SUCTION LINE ACCESS VALVE. CLOSE DISCHARGE LINE ACCESS VALVE AND REMOVE GAGE.

STEP 5. TEST FOR LEAKS (PAR. 6-3). DISCHARGE THE REFRIGERANT SYSTEM (PAR. 6-16).

STEP 6. REMOVE CAP FROM DISCHARGE ACCESS VALVE. ATTACH A SUITABLE VACUUM PUMP TO SUCTION LINE ACCESS VALVE AND A MANOMETER TO THE DISCHARGE LINE ACCESS VALVE. OPEN THE ACCESS VALVES AND OPERATE THE VACUUM PUMP UNTIL THE MANOMETER INDICATES 2.6 MM HG. ABS. (MILLIMETERS OF MERCURY, ABSOLUTE).

ME 4120-268-15/6-14 ②

*Figure 6-14. Pressure testing and evacuating the refrigerant system (Sheet 2 of 3).*



STEP 7. CLOSE THE SUCTION LINE ACCESS VALVE AND STOP THE PUMP. ATTACH HOSE FROM REFRIGERANT DRUM, PURGE AIR FROM LINE WITH REFRIGERANT AND SLOWLY BREAK THE VACUUM BY OPENING THE SUCTION LINE ACCESS VALVE UNTIL MANOMETER INDICATES 760 MM HG. ABS. CLOSE SUCTION ACCESS VALVE.

NOTE: RISE IN PRESSURE WILL BE INFLUENCED BY AMBIENT TEMPERATURE. MAKE SURE VACUUM IN SYSTEM IS COMPLETELY RELIEVED BEFORE RE-EVACUATING.

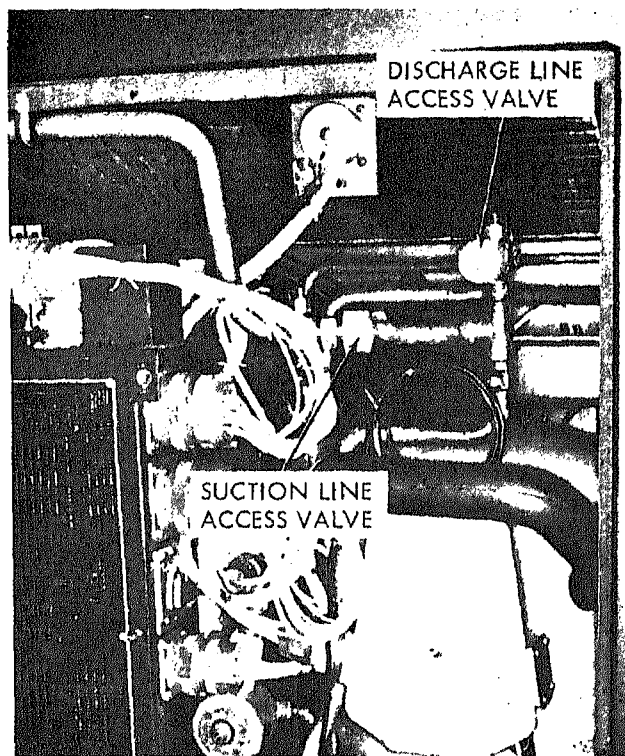
STEP 8. REMOVE REFRIGERANT DRUM AND CONNECT VACUUM PUMP TO SUCTION LINE ACCESS VALVE. PURGE AIR FROM HOSE, START PUMP AND OPEN SUCTION LINE ACCESS VALVE. OPERATE PUMP UNTIL MANOMETER AGAIN READS 2.5 MM HG. ABS.

STEP 9. CLOSE SUCTION LINE ACCESS VALVE AND ALLOW UNIT TO STAND UNDER VACUUM FOR APPROXIMATELY 12 HOURS. IF NO NOTICEABLE RISE IN PRESSURE OCCURS, THE SYSTEM IS READY FOR CHARGING. CLOSE ACCESS VALVES AND REMOVE VACUUM PUMP AND MANOMETER. INSTALL ACCESS VALVE CAPS.

ME 4120-268-15/6-14 (3)

*Figure 6-14. Pressure testing and evacuating the refrigerant system (Sheet 3 of 3).*



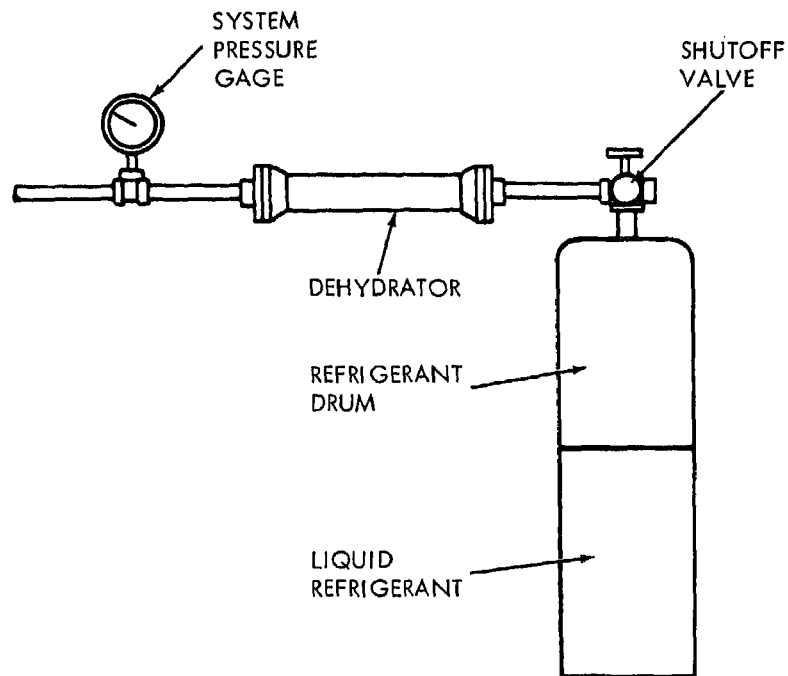


WARNING: AVOID BODILY CONTACT WITH LIQUID REFRIGERANT AND AVOID INHALING REFRIGERANT GAS. BE ESPECIALLY CAREFUL THAT REFRIGERANT-22 DOES NOT CONTACT THE EYES. IN CASE OF REFRIGERANT LEAKS, VENTILATE THE AREA IMMEDIATELY.

STEP 1. REMOVE CAPS FROM ACCESS VALVES.

ME 4120-286-15/6-15 ①

*Figure 6-15. Charging the refrigerant system (Sheet 1 of 3).*



STEP 2. CONNECT A SUITABLE REFRIGERANT CHARGING PRESSURE MANIFOLD TO THE REFRIGERANT CHARGING HOOKUP. CONNECT SERVICE HOSES FROM MANIFOLD LOOSELY TO ACCESS VALVES. OPEN REFRIGERANT DRUM SHUTOFF VALVE SLIGHTLY TO PURGE HOSES. TIGHTEN HOSE CONNECTIONS AT ACCESS VALVES. CONNECT A PRESSURE GAGE TO THE SUCTION LINE ACCESS VALVE.

NOTE: SET REFRIGERANT DRUM IN AN UPRIGHT POSITION SO THAT ONLY GASEOUS REFRIGERANT WILL ENTER SYSTEM. TO FACILITATE SPEED OF CHARGING, SET REFRIGERANT DRUM IN WARM WATER. NEVER USE A HEATING TORCH FOR THIS PURPOSE.

ME 4120-268-15/6-15 ②

*Figure 6-15. Charging the refrigerant system (Sheet 2 of 3).*

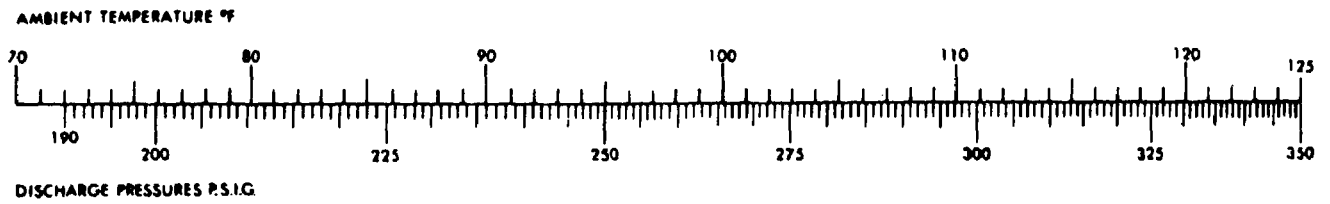


- NOTE: SET TEMPERATURE CONTROL ABOVE AMBIENT TEMPERATURE TO INSURE UNIT OPERATES CONTINUOUSLY ON COOLING CYCLE.
- STEP 3. OPEN REFRIGERANT DRUM SHUTOFF VALVE AND ACCESS VALVE. START UNIT (PAR. 2-11) AND WEIGH IN 15.5 LB CHARGE OF REFRIGERANT-22. CONTINUE ADDING REFRIGERANT SLOWLY UNTIL SIGHT GLASS INDICATES FULL.
- NOTE: OPERATE UNIT IN "COOL" POSITION ONLY DURING CHARGING OPERATION.
- STEP 4. PARTIALLY BLOCK EVAPORATOR DISCHARGE GRILLE WITH A CARDBOARD BAFFLE. ADJUST BAFFLE UNTIL SUCTION LINE PRESSURE GAGE READS 55 PSIG. CONTINUE ADDING REFRIGERANT-22 SLOWLY, WHILE MAINTAINING 55 PSIG SUCTION PRESSURE BY ADJUSTING THE BAFFLE, UNTIL THE DISCHARGE PRESSURE GAGE READING OBTAINED CORRESPONDS TO THE AMBIENT TEMPERATURE (FIG. 6-3).
- STEP 5. CLOSE ACCESS VALVES AND CLOSE REFRIGERANT DRUM SHUTOFF VALVE. STOP THE UNIT (PAR. 2-12). DISCONNECT CHARGING MANIFOLD HOSES FROM ACCESS VALVES. INSTALL VALVE CAPS (STEP 1).

ME 4120-268-15/6-15 (3)

Figure 6-15. Charging the refrigerant system (Sheet 3 of 3).

DISCHARGE PRESSURES  
AT CONSTANT 55<sup>PSI</sup> SUCTION  
AMBIENT FROM 70° F TO 125° F



ME 4120-268-15/6-16

*Figure 6-16. Discharge line pressures at constant 55 psi suction, ambient temperatures from 70°F. to 125°F.*

## APPENDIX A

### REFERENCES

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#### A-1. Painting

TM 9-213                      Painting Instructions for Field Use

#### A-2. Radio Supression

TM 11-483                      Radio Interference Suppression

#### A-3. Maintenance

TM 38-750                      Army Equipment Record Procedures

TM 5-4120-268-25P              Department of the Army Technical Manual; Organizational, Direct and  
General Support, and Depot parts and special tools list

TM 5-764                      Electric Motor and Generator Repair

#### A-4. Shipment and Administration Storage

TB 740-93-2                      Preservation of USAMEC Mechanical Equipment for Shipment and Stor-  
age

TB 740-90-1                      Administrative storage of Equipment

## APPENDIX B

### BASIC ISSUE ITEMS

#### Section I. INTRODUCTION

##### B-1. Scope

This appendix lists items which accompany the air conditioner or are required for installation, operation, or operator's maintenance.

##### B-2. General

This Basic Issue Items List is divided into the following sections:

*a. Basic Issue Items—Section II.* A list of items which accompany the air conditioner and are required by the operator/crew for installation, operation, or maintenance.

*b. Maintenance and Operating Supplies—Section III.* A listing of maintenance and operating supplies required for initial operation.

##### B-3. Explanation of Columns

The following provides an explanation of columns in the tabular list of Basic Issue Items, section II.

*a. Source, Maintenance, and Recoverability Codes (SMR).*

(1) Source code, indicates the selection status and source for the listed item. Source code is:

Code	Explanation
P	Applied to repair parts which are stocked in or supplied from GSA/DSA or Army supply system, and authorized for use at indicated maintenance categories.

(2) Maintenance code, indicates the lowest category of maintenance authorized to install the listed item. The maintenance level code is:

Code	Explanation
C	Operator/crew.

*b. Federal Stock Number.* This column indicates the Federal Stock number assigned to the item and will be used for requisitioning purposes.

*c. Description.* This column indicates the Federal item name and any additional description of

the item required. A part number or other reference number is followed by the applicable five-digit Federal supply code for manufacturers in parenthesis.

*d. Unit of Measure (u/m).* A 2-character alphabetic abbreviation indicating the amount or quantity of the item upon which the allowances are based, e.g, ft, ca, pr, etc.

*e. Quantity Incorporated in Unit.* This column indicates the quantity of the item used in the functional group or the assembly group.

*f. Quantity Furnished With Equipment.* This column indicates the quantity of an item furnished with the equipment.

*g. Illustration.* This column is divided as follows:

(1) *Figure number.* Indicates the figure number of the illustration in which the item is shown.

(2) *Item number.* Indicates the callout number used to reference the item in the illustration.

##### B-4. Explanation of Columns in the Tabular List of Maintenance and Operating Supplies Contained in Section III

*a. Component Application.* This column identifies the component application of each maintenance or operating supply item.

*b. Federal Stock Number.* This column indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

*c. Description.* This column indicates the item name and brief description.

*d. Quantity Required for Initial Operation.* This column indicates the quantity of each maintenance or operating supply item required for initial operation of the equipment.

*e. Quantity Required for 8-Hours Operation.* This column indicates the estimated quantities required for an average 8 hours of operation.

f. Notes. This column indicates informative notes keyed to data appearing in a preceding column.

## B-5. Abbreviations

ea -----each  
qt -----quart  
pt -----pint

## Section II. BASIC ISSUE ITEMS

(1) SMR code	(2) Federal stock number	(3) Description Ref No. & mfr code	(4) Usable on code	(5) Qty inc in unit	(6) Qty furn with equip	(7) Illustration	
						(A) Fig No.	(B) Item No.
PC	5220-559-9618	Basic Issue Items Manufacturer or depot installed					
		Case, Manual Manual, Department of Army Technical Manual; Operator Organizational, Direct Support, General Support and Depot Maintenance Manual, TM 5-4120-268-15	ea ea		1 1		

## Section III. MAINTENANCE AND OPERATING SUPPLIES

(1) Component application	(2) Federal stock number	(3) Description	(4) Quantity required F/initial operation	(5) Quantity required F/8 hrs operation	(6) Notes
Air Filter	9150-753-4764	AIR FILTER ADHESIVE Oil, Lubricating Grade—30 1 qt can	(1)	(1)	(1) Quantity required for stockage will be determined and authorized based on method of application used and frequency required for proper servicing.
	4130-860-0042	Coater, Air Filter Adhesive, 1 pt container	(1)	(1)	

## APPENDIX C

### MAINTENANCE ALLOCATION CHART

#### Section I. INTRODUCTION

##### C-1. General

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

c. Section III Special Tools and Test Equipment. (Not applicable.)

d. Section IV contains supplemental instructions, explanatory notes and/or illustrations required for a particular maintenance function.

##### C-2. Explanation of Columns in Section II

a. *Group Number, Column (1).* The functional group is a numerical group set up on a functional basis. The applicable functional grouping indexes (obtained from TB 750-93-1, Functional Grouping Codes) are listed on the MAC in the appropriate numerical sequence. These indexes are normally set up in accordance with their function and proximity to each other.

b. *Functional Group, Column (2).* This column contains a brief description of the components of each functional group.

c. *Maintenance Functions, Column (3).* This column lists the various maintenance functions (A through K) and indicates the lowest maintenance category authorized to perform these functions. The symbol designations for the various maintenance categories are as follows:

- C—Operator or crew
- O—Organizational maintenance
- F—Direct support maintenance
- H—General support maintenance
- D—Depot maintenance

The maintenance functions are defined as follows:

- A—Inspect: To determine serviceability of an item by comparing its physical, mechanical and electrical characteristics with established standards.
- B—Test: To verify serviceability and to detect electrical or mechanical failure by use of test equipment.
- C—Service: To clean, to preserve, to charge, to paint, and to add fuel, lubricants, cooling agents, and air.
- D—Adjust: To rectify to the extent necessary to bring into proper operating range.
- E—Align: To adjust specified variable elements of an item to bring to optimum performance.
- F—Calibrate: To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.
- G—Install: To set up for use in an operational environment such as an emplacement, site, or vehicle.
- H—Replace: To replace unserviceable items with serviceable assemblies, subassemblies, or parts.
- I—Repair: To restore an item to serviceable condition. This includes, but is not limited to, inspection, cleaning, preserving, adjusting, replacing, welding, riveting, and strengthening.
- J—Overhaul: To restore an item to a completely serviceable condition as prescribed by maintenance serviceability standards using the Inspect and Repair Only as Necessary (IROAN) technique.
- K—Rebuild: To restore an item to a standard as nearly as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements (items) using original manufacturing tolerances and specifications, and subsequent reassembly of the item.

d. *Tools and Equipment, Column (4).* This column is provided for referencing by code the Special tools and test equipment (sec III) required to perform the maintenance functions (sec II).

e. *Remarks, Column (5).* This column is provided for referencing by code the remarks (sec IV) pertinent to the maintenance functions.



### C-3. Explanation of Columns in Section IV

a. *Reference Code.* This column consists of two letters separated by a dash, both of which are references to section II. The first letter refer-

ences column 5 and the second letter references a maintenance function, column 3, A through K.

b. *Remarks.* This column lists information pertinent to the maintenance function being performed, as indicated on the MAC, section II.

### Section II. MAINTENANCE ALLOCATION CHART

(1) Group No.	(2) Functional group	(3) Maintenance functions											(4) Tools and equipment	(5) Remarks
		A	B	C	D	E	F	G	H	I	J	K		
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild		
18	BODY, CAB, HOOD AND HULL													
1801	Body, Cab, Hood & Hull Assy													
	Casing assembly -----								H					
	Casing -----								H					
	Cover, access -----								O					
	Cover, CBR -----								O					
	Damper door -----								O					
	Control, damper door -----				O				O					
	Grilles -----			C					O	O				
	Guard, condenser fan -----			C					O					
	Insulation -----								F					
	Panels -----								O					
	Gaskets, panel -----	O							O					
	Screens -----	C		C					O					
	Base -----								H					
22	BODY CHASSIS OR HULL & ACCESSORY ITEMS													
2201	Canvas, Rubber, or Plastic Items													
	Cover, Canvas -----								O					
2210	Data Plates:													
	Plates, data -----								O					
	Plates, information -----								O					
33	SPECIAL PURPOSE KITS													
3803	Winterization Kits:													
	Heater, compressor crank-case -----		O						O					
	Elements, heating -----		O						O					
40	ELECTRIC MOTORS													
4000	Motor Assembly:													
	Motor, condenser fan -----		O						O	O				
	Motor, evaporator fan -----		O						O	O				
4010	Master or Auxiliary Control Assembly													
	Junction box -----								O					
	Panel, Control -----		O						O					
4011	Circuit Breakers:													
	Circuit breaker -----		O						O					
	Fuse -----		O						O					
	Switch, high pressure -----		O						F					
	Switch, low pressure -----		O						F					
4012	Switches:													
	Switch, rotary selector -----		O						O					
	Switch, thermostatic -----		O						O					

(1) Group No.	(2) Functional group	(3) Maintenance functions											(4) Tools and equipment	(5) Remarks
		A	B	C	D	E	F	G	H	I	J	K		
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild		
	Compressor crankcase heater -----		O						O					
	Elements, heating -----		O						O					
	Temperature control -----		O						O					
4015	Relay or Assembly:													
	Relay, heater -----		O						O					
	Relay, motors -----		O						O					
	Relay, time delay -----		O						O					
4016	Coils:													
	Coil, solenoid valve -----		O						O					
4017	Transformers: Rectifiers:													
	Transformer, control circuit -----		O						O					
4018	Terminal Blocks, Junction Boxes:													
	Terminal boards -----								O					
	Wiring harness assembly -----								O	O				
	Fittings -----								O					
	Receptacles -----		O						O					
	Wiring -----		O						O	O				
4019	Radio Interference Suppression:													
	Filters, RFI -----		O						O					
	Ground leads -----								O					
	Rectifier -----		O						O					
50	REFRIGERATION AND AIR CONDITIONING COMPONENTS													
5200	Gas Compressor Assembly:													
	Compressor and motor assembly -----		O	F					F	O				A
5217	Refrigerant Piping:													
	Dehydrator -----								F					
	Fittings -----		F						F					
	Sight glass liquid indicator -----	O	F						F					
	Tubing -----		F						F					
	Valve, check -----								F					
	Valve, expansion -----		F		F				F					
	Valve, service access -----								F					
	Valve, solenoid -----		O						F	O				B
	Valve, pressure regulating -----		F		F				F					
	Valve, pressure relief -----								F					
5224	Refrigerant Accumulator:													
	Accumulator -----		F						F					
	Receiver, liquid -----		F						F					
5230	Condenser:													
	Coil -----		F	O					F					
5241	Evaporator:													
	Coil -----		F	O					F					
	Condensate drain assy -----			O					F					
	Drain hose -----			O					F					
	Drip pan -----			O					F					
	Tube, gooseneck -----			O					F					
	Valve, check -----			O					O					
	Eliminator, mist -----			O					O					

(1) Group No.	(2) Functional group	(3) Maintenance functions											(4) Tools and equipment	(5) Remarks
		A	B	C	D	E	F	G	H	I	J	K		
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild		
5243	Blower Assembly:													
	Condenser fan -----		--	--	--	--	--	--	0					
	Evaporator fan -----		--	--	--	--	--	--	0					
5244	Thermostatic Controls:													
	Temperature Control -----		0	--	--	--	--	--	0					
5245	Air Filters:													
	Filter, air conditioning -----		--	0	--	--	--	--	0					
	Filter, fresh air -----		--	0	--	--	--	--	0					

## Section IV. REMARKS

Reference code	Remarks
A-1	Repair by replacing defective external components only.
B-1	Repair by replacing coil.

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KENNETH G. WICKHAM,  
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W. C. WESTMORELAND,  
*General, United States Army,*  
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208 VOLT  
3 PHASE  
60 OR 400  
CYCLE